

**WSDA**  
**SPECIALTY CROP BLOCK GRANT PROGRAM**  
**2013**  
**FINAL PERFORMANCE REPORTS**

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**Project Title:** Cherry Powder Placebo Development

**Partner Organization:** Washington State Fruit Commission (WSFC)

### **PROJECT SUMMARY**

The purpose of this project was for the Washington State Fruit Commission (WSFC) to utilize funds from the Washington State Department of Agriculture (WSDA) Specialty Crop Block Grant (SCBG) program to develop a freeze-dried placebo cherry powder. This placebo powder would then be used for testing in human trials against actual Bing cherry powder. The lack of a placebo powder, as well as a standardized cherry powder, has constrained the Washington State cherry industry's ability to conduct health and nutrition research on sweet cherries. The intention of this project was to create a placebo that would match a standardized cherry powder product that WSFC was, at that time, in the process of developing. The placebo powder would match the standardized cherry powder in terms of taste, smell, consistency, and caloric content, but would be absent of any whole cherry or cherry components. This placebo would then be available to utilize in trials along with the WSFC cherry powder, and serve to demonstrate the health and nutrition benefits of consuming sweet cherries.

The Washington State cherry industry has been investing in health and nutrition research since 2005. However, each study that has been conducted since then has cited the lack of a standardized product as a limiting factor. Furthermore, this impacts the timing of when research studies can be conducted, given that Washington fresh sweet cherries are unavailable year-round. Prior to the funding of this SCBG, WSFC funded a study on the effects of cherry consumption on prostate health in men. However, the research timeline was delayed due to a lack of available product, and variances in anthocyanin content contributed to gaps in study findings. Researchers agreed that a standardized product and a placebo were necessary if WSFC were to have success in its health research efforts. Furthermore, with growing production, the Washington State cherry industry is concerned about building lasting demand for fresh sweet cherries in the U.S. and abroad. Communicating the health benefits of consuming cherries is seen as a key market development strategy, and WSFC would like to make investments in this area to solidify cherries' position as a healthy option for consumers.

At the time this project was proposed, WSFC was in the process of developing a standardized cherry powder using industry funds. WSFC then sought assistance from the WSDA Specialty Crop Block Grant program to fund the development and production of a placebo powder, a critical step towards the successful execution of research studies. Because additional research studies could not take place without the development of a placebo, this project was of great importance to the industry and its health and nutrition research efforts.

This project was new and did not have links to previously-funded SCBGP projects.

### **PROJECT APPROACH**

In October 2013, upon approval of the project, WSFC contracted with the United States Department of Agriculture's Agricultural Research Service (USDA/ARS) to begin formulation of the cherry placebo. The standardized cherry powder, which was developed independently by WSFC, was sent to USDA/ARS for analysis. From October 1, 2013 through October 31, 2014, WSFC worked with the USDA/ARS Western Human Nutrition Research Center (WHNRC) to develop the formula for the placebo powder. Dr. Tara McHugh at the USDA/ARS consulted with Don Olson, a food technologist, to develop a powder that matched the standardized cherry powder product in terms of taste, smell, consistency, and caloric content when dissolved in water. As a result of their work, a formula for the placebo powder in addition to a standardized freeze drying process was completed in August 2014.

In November 2014, WHNRC assessed how the placebo reacted in the planned water soluble delivery method when compared to the cherry powder, completing the first phase of the approved Project Plan. The results of this test are crucial for researchers preparing samples for participants in advance of consumption. Several experiments were conducted, and the placebo tested positive for the presence of soluble phenolics. Follow up experiments resulted in the identification of maltodextrin as the cause of the false positive. In addition, the USDA/ARS conducted a side-by-side comparison of the anti-oxidant content and total soluble phenolic content of the cherry powder and placebo. The placebo was found to contain no anti-oxidant content.

Following the favorable outcomes of both tests, WSFC selected Columbia Phyto Technology (PowderPure) as the powder manufacturer. Columbia Phyto Technology (PowderPure) was the producer of the standardized cherry powder and this allowed for consistency in product development for the placebo. However, the processes of obtaining a quote for production of the placebo powder proved to be an arduous and time consuming process. Under WSFC's original timeline, the placebo was to be produced by October 2014 with RFPs issued to potential researchers starting in

November 2014. However, because of the change in how the final product will be administered (in a water soluble form rather than in powder form), additional formulation was required. This delayed the timeline and ultimately the placebo was not produced until May 2016. The formulation was tweaked to ensure that all differences between the cherry powder and placebo were minimized. Furthermore, additional reformulation was required to ensure that the powders did not clump, and the final processing was completed in August 2016. The placebo and cherry powders are now ready for packaging and WSFC is working to identify a packer that can work in a temperature-controlled environment and insert the powder into 25-gram metal film bags. Once packaged, these powders will be available for future research studies.

Despite the delays in the manufacturing of the placebo powder, the WSFC and the California Cherry Marketing & Research Board (CCMRB) convened a one-day Health & Nutrition Committee (HNC) meeting and a gathering of the sweet cherry industry's Scientific Advisory Board (SAB) on January 8, 2015 at the UC Davis Western Human Nutrition Research Center. The meeting was organized to gain consensus from the SAB and industry to identify top health research objectives and receive feedback on the development of a Request for Proposal that will be utilized for research that will be conducted using the powders. The objectives and feedback laid out will be instrumental in advancing the sweet cherry industry's research agenda once the powder is packaged in the 25-gram bags. While it finalizes arrangements related to packaging, WSFC is already overseeing an initial study with the bulk powder.

Through a separate WSDA SCBG, in the 2015 funding year, WSFC entered into a contract with Texas Agricultural & Mechanical University to begin conducting research as soon as the powders were available for use. Research is currently ongoing, and progress will be reported in the Annual Performance Report for that grant.

Researchers at USDA/ARS played the primary role in development of the placebo powder formula. The USDA/ARS team has experience developing similar placebos for other fresh fruit products. USDA/ARS's work on this project was completed on March 31, 2015.

Another partner that has an interest in WSFC's health and research efforts is CCMRB. Together, WSFC and CCMRB representatives participate in joint meetings to discuss research priorities that affect the entire cherry industry. When available, results of research studies will be communicated to these groups at future SAB and HNC meetings.

After formulation of the powder, WSFC selected Columbia Phyto Technology (PowderPure) as the manufacturer of the placebo powder formula. The WSFC's primary contact at this company changed abruptly, delaying the negotiation of the contract. Nevertheless, in September 2015, through constant communication initiated by WSFC, a plan was put into place to move forward with the development of the powder. The powder was produced in May 2016 and Columbia Phyto Technology (PowderPure) worked to tweak the formulation to prevent clumping, as well as match the placebo to the cherry powder. Columbia Phyto Technology (PowderPure) is now working with WSFC to determine an acceptable packaging solution for both powders. Once packaged, these powders will be available for future research studies.

Because of the nature of this project, it has only benefitted the fresh sweet cherry industry.

## **GOALS AND OUTCOMES ACHIEVED**

As outlined in the project proposal, this project had three goals:

1. To generate interest among the scientific research community to conduct research on the health benefits of eating fresh sweet cherries
2. To increase media publicity about the health benefits of eating fresh sweet cherries
3. To increase sales of Washington State fresh sweet cherries

In order to achieve performance goals and Expected Measurable Outcomes, WSFC focused on completing project activities within designated timeframes. Unfortunately, these objectives were not met due to delays in manufacturing the powder. That being said, the most fundamental component of this project was the development of the cherry placebo powder. As a direct result of this grant, WSFC was able to formulate and produce the placebo powder to be used in research trials. Ultimately, WSFC now has the foundation in place to meet the above objectives, and plans to do so, albeit after the grant period has concluded.

While no measures have been met at this time, significant progress has been made to enable WSFC to conduct future research trials on fresh sweet cherries. The development and manufacturing of a placebo powder is a critical step towards conducting successful research projects. WSFC has already applied and received funding for another WSDA SCBG project to conduct research on the effects of cherry consumption on modulation of intestinal bacterial populations, inflammation, and obesity markers. WSFC plans to meet the Expected Measurable Outcomes and will report progress through the Annual Performance Report for that grant project.

<b>Project Activity</b>	<b>Responsible Party</b>	<b>Timeframe Completed (month and year)</b>
Contract with USDA/ARS initiated	WSFC	October, 2013
Standardized cherry powder samples sent to USDA/ARS for analysis	BCI and USDA/ARS	October, 2013
Analysis, sensory testing, and product formulation	USDA/ARS	November 2013 – March 2015
Placebo manufacturing partner identified	BCI	December 2014
Placebo produced	PowderPure	January 2016
Final sensory tests conducted and placebo available for use	USDA/ARS	May 2016
Proposals selected and placebo distributed	BCI and WSFC	March 2016
Interim report prepared with results for Goal 1 provided	BCI	November 2015
Project completed and final report written which includes Goal 2 and Goal 3, along with any update on Goal 1.	BCI	November 2016

Much of the project plan has been completed, as outlined above. Additional steps that remain, as noted, have encountered unexpected delays. Remaining work plan activities include: packaging the powders, issuing a Request for Proposal to qualified research institutions, selecting researchers and distributing the placebo, conducting research, and publishing research results. WSFC plans to complete all project activities within the work plan and achieve project goals, though not within the grant period.

The Expected Measurable Outcomes for this project were designed to take place after the placebo is produced and packaged. At the end of the grant period, the cherry powder and placebo had not yet been packaged, and therefore research utilizing these powders was unable to begin under this grant. Because of this, there are no key results to report at this time. However, achievement of the targets set in the proposal will still come after the conclusion of this grant period. Despite the delays (discussed above) which prevented multiple research projects to be completed and reported on during the grant period, WSFC has already initiated research into the effects of sweet cherry consumption on gut health (with the support of a SCBG in FY15). The placebo powder is a critical component for this project. Although it has not been packaged yet, WSFC was able to send a portion of the powder to the researcher at Texas A&M University so that studies may begin on the impact of sweet cherry consumption on obesity-related disorders. Furthermore, more studies will be conducted after the powder has been individually packaged. Ultimately, this will form the basis for scholarly findings that WSFC anticipates will generate media interest and increased sales of fresh, sweet cherries.

Upon the completion of the ongoing research, WSFC expects to garner approximately \$500,000 in media discussion about cherry health benefits. Given that the timeline for research has been extended, this will take some time to achieve. Successful research studies will contribute to market development efforts, and ultimately increase the sales value of Washington State fresh sweet cherries. WSFC expects that this will begin providing significant impact to cherry sales during the 2018 season (once initial studies are completed and results are publicized).

### **BENEFICIARIES**

While no research studies have been completed yet, this project was an important step towards that goal. This project directly affects 1,480 sweet cherry growers in Washington State who produce around \$600 million worth of cherries each year. Development of a cherry placebo, a critical component for cherry research and nutrition trials, will allow WSFC to conduct studies that aim to prove health benefits of consuming fresh cherries. Positive study results will be an important marketing tool and will affect the entire Washington cherry industry.

As previously indicated, this project benefits sweet cherry growers who produce around \$600 million worth of cherries each year. Successful research and nutrition studies will contribute to an increase in consumer awareness and demand for Washington sweet cherries. Furthermore, WSFC expects that positive health benefits evidenced by research studies could drive a 10% increase in crop value.

### **LESSONS LEARNED**

Even with appropriate planning, projects can nevertheless encounter interruptions or delays. For example, this project encountered delays in the beginning phase with the formulation of the cherry powder. Additional interruptions included negotiating a contract with a manufacturer and additional powder reformulation before the manufacturing could begin. Furthermore, unexpectedly, finding a packer for the placebo and cherry powders has been quite challenging. While a crucial part of the project, it is not something that was anticipated to be a difficult task. To keep the integrity of the powders intact, a specialized packaging process is required. Many packers have been unwilling to take on such a small project and therefore the powder remains packed into 15 kg boxes at this time. Ultimately, WSFC needs to have the

powders packaged into 25 gram packets for easy use in research trials. WSFC is exploring alternative packaging options, and remains optimistic that this part of the project can be completed, albeit not within the grant period. Most importantly, WSFC now has key components needed to conduct future research on cherry nutrition benefits. This project has laid the foundation for success in cherry health research efforts.

No unexpected outcomes or results were observed in the implementation of this project.

While the goals and outcomes have not yet been achieved, WSFC has taken important steps to further the soundness of cherry research efforts through the formulation and development of a cherry placebo powder. The goals outlined in the project proposal have not been met during this particular grant timeline, but will certainly be met in the foreseeable future. WSFC has already taken steps to ensure that the placebo powder and standardized cherry powders are being used in research efforts funded with the support of a separate WSDA SCBG project. In terms of “lessons learned”, this project is a great example of why it is important to remain adaptable as timelines shift. Furthermore, delving further into miniscule details of a project before implementing it may help predicting challenges before they arise. Finally, having a backup plan to fund and advance project efforts after the conclusion of the grant period, if needed, is critical to ensuring that the overall impact remains positive and significant.

#### **ADDITIONAL INFORMATION**

WSFC has utilized \$38,982.80 in SCBG funds towards this project. WSFC has contributed \$26,000 in industry funds and another \$10,000 in in-kind contributions towards the completion of this project. Funds were utilized to develop and manufacture the cherry placebo powder. It is expected that WSFC will spend additional funds to complete the packaging of the placebo and cherry powders following the submission of this report. Because a packer has not yet been identified, the amount of additional industry expenditures is not known at this time; however, contribution already exceeds the match that was indicated in the project proposal.

#### **CONTACT INFORMATION**

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**Project Title:** Reverse Trade Mission – Canada and China

**Partner Organization:** Washington State Wine Commission (WSWC)

### **PROJECT SUMMARY**

This project primarily sought to address the issue of too few Washington State wines available in high potential export markets, as well as the need for a more robust, coordinated effort to capitalize on the opportunities for wine tourism with foreign visitors. Washington's state wine industry has an \$8.5 billion economic impact on Washington State's economy and supports more than 14,000 jobs in the State, but exports only total approximately 2% of annual wine production. By contrast, California wineries export approximately 16% of their wines. The WSWC targeted improved sales and tourism from Canada and China for this project, because those two markets have the highest potential for Washington wine.

The project was important and timely because, in spite of the accolades that Washington wines receive, awareness among trade, media, and consumers overseas is limited. As a result, sales, distribution, and wine tourism are limited too. Thus, at the time of application, only 20 Washington State wineries (out of 750) had distribution in Canada, and only 13 had distribution in China. These numbers are low, but actually represent a significant increase compared with prior years. Interest in Washington wines in both markets is growing, thanks to targeted marketing outreach. But a more comprehensive program was important to generate more significant attention for the Washington producers. Moreover, it was timely because the Washington State wine industry is not the only wine industry seeking to expand sales in Canada and China. Wine associations from around the world, including both those representing Old World European producers and New World producers are focusing their attention on these high-potential markets. Without a robust program to bring influential trade and media to an event like Taste Washington, the WSWC risked missing an opportunity to increase its market share through more sales, distribution, and wine tourism.

This project did not build upon a previous SCBGP-funded initiative.

### **PROJECT APPROACH**

Below is a summary of tasks by target market.

#### *Canada*

The WSWC hosted six major wine journalists from the provinces of British Columbia, Ontario, and Quebec. Combined, these three provinces represent approximately 80% of the Canadian wine industry. One of these journalists arrived in advance of the Taste Washington wine tasting event and visited several wineries in Eastern Washington. The others arrived for Taste Washington and focused their attention on learning about Washington wines at the event itself. Their visit included not only significant tasting opportunities with 200 wineries pouring, but also educational opportunities through seminars and two wine-and-food pairing dinners with WSWC staff and representatives.

#### *China*

The WSWC hosted 11 members of the Chinese trade and media, primarily from Shanghai but also from other cities where Washington wine has distribution. In contrast to the Canadian delegation, there was a greater focus on trade because Washington wine has less of a presence in the Chinese market. Participants arrived for the Taste Washington wine tasting event, and as with the Canadian group, also gained the opportunity for education through seminars and wine-and-food pairing lessons through meals with WSWC staff and representatives. After Taste Washington, the majority of attendees visited four wineries in Washington State to gain a greater understanding of the wine production process and the unique nature of the Washington State wine industry.

The visit yielded gains in both trade and distribution. Export growth is discussed in the sections below. Regarding media, the following articles were prepared as a direct result of the project:

- (1)Kurtis Kolt in Westender Vancouver (53,671 circulation, valued at \$10,000)
- (2)Bill Zacharkiw in Montreal Gazette (116,446 circulation, valued at \$10,000)
- (3)Ruby Gao in Shanghai Daily (100,000 circulation, valued at \$20,926.58)
- (4)Beijing TV News Live Beijing Segment (estimated 50,000 viewership, valued at \$2,575.58)
- (5)Monica Zhu in Modern Weekly (estimated 50,000 circulation, valued at \$10,000)
- (6)Monica Zhu in Restaurant Review (estimated 50,000 circulation, valued at \$10,000)
- (7)Monica Zhu in Horizon (estimated 50,000 circulation, valued at \$10,000)
- (8)Monica Zhu in Urban Space (estimated 50,000 circulation, valued at \$10,000)

The WSWC had several key contributors to this project, including the United States Department of Agriculture (USDA)'s overseas staff, Visit Seattle, Nantel & Associates (the WSWC's retainer-based contractor), and several Washington State wineries. In order to select the most influential trade and media for the reverse mission, the WSWC took nominations from the USDA Agricultural Trade Offices (ATO) in Shanghai and Hong Kong, as well as Nantel & Associates and Washington wineries. Because of the quality of the nominees, the WSWC decided to expand the size of its mission and fund 17 guests (6 from Canada and 11 from China) through SCBG funds. ATO Shanghai assisted with travel logistics for some of the guests, which ensured they could participate. Visit Seattle provided interpretation for the three non-English speaking guests from China. Nantel & Associates helped host the visitors from Canada, and four Washington wineries (Columbia Crest, Hedges Family Estate, Milbrandt Vineyards, and Chateau Ste. Michelle) hosted guests from China following Taste Washington, to give the trade and media visitors an opportunity to see Washington wine country firsthand.

The project did not benefit commodities other than wine grapes.

### **GOALS AND OUTCOMES ACHIEVED**

The activities that were completed as part of this project were all described in the previous section. They included participation in Taste Washington, seminars, wine dinners, and a tour of Washington wine country. The trade and media visitors were selected thanks to their influence in the Canadian and Chinese wine markets, and their ability to position Washington wine brands for exposure and new business. Ultimately the goals for the project were to support new distribution and attention for Washington wines in both countries.

The Expected Measurable Outcome goals for the project were (1) Washington wineries with distribution in Canada and China will expand significantly, (2) Washington wineries will report increased sales as a result of new distribution agreements that greatly exceed cost of activity, (3) Online and print articles secured through activity will expose consumers to Washington State wine industry, (4) Online and print article advertising value equivalent secured through activity will greatly exceed cost of activity, (5) over half of tasting room managers will report an increase in Canadian and/or Chinese visitors over a two year period.

Gains are expected to be made for all Expected Measurable Outcomes in the long-term, but the WSWC is able to report on current progress below.

A comparison of the activities and goals established for the project and the actual accomplishments are listed below:

<b>Expected Measurable Outcome</b>	<b>Goal</b>	<b>Baseline</b>	<b>Actual</b>
Washington wineries with distribution in Canada and China will expand significantly	70	33	55
Washington wineries will report increased sales as a result of new distribution agreements that greatly exceed cost of activity	\$300,000	0	\$5,468,055
Online and print articles secured through activity will expose consumers to Washington State wine industry	1 million consumers reached	0	520,117
Online and print article advertising value equivalent secured through activity will greatly exceed cost of activity	\$200,000	NA	\$83,502.16
Over half of tasting room managers will report an increase in Canadian and/or Chinese visitors over a two year period	55%	NA	~100%

WSWC's project expanded distribution, generated media, and increased wine tourism in Washington State. With respect to distribution, the number of wineries exporting to Canada and China increased by 67% during the lifetime of the project. While this expansion did not quite reach the goal set at the beginning of the project, it is still a significant success for the Washington wine industry. At the same time, the value of exports more than exceeded the goal thanks to new, high-value distribution in Canada and China.

Meanwhile, the goals set for media were estimates that turned out to be overly ambitious. WSWC's generated eight quality media placements, reaching an estimated 520,117 people with a value of \$83,502.16. The placements were primarily in leading trade and lifestyle magazines that are critical for expanding awareness of the Washington State wine industry. Thus, WSWC's remains satisfied with the media results. Finally, the WSWC has learned from its wineries that international tourist visits are increasing with China in particular having a large increase. While this

information is anecdotal, it demonstrates that Canadian and Chinese wine tourism has increased following from the project.

The Washington State wine industry in general benefited from the project. Hundreds of wineries had the opportunity to share their wines with the visiting trade and media at Taste Washington. Meanwhile, the visitors also had the opportunity to obtain more in-depth knowledge about Washington State wine via educational seminars, winery visits, and wine and food pairing dinners.

The project helped ensure that (1) wineries that exported before saw demand increase in Canada and China, (2) wineries that were looking to export had new distribution opportunities and began exporting to the target markets, and (3) non-exporting wineries benefited from media exposure and the expansion of wine tourism.

As discussed in the Expected Measurable Outcomes section above, the project generated eight high-quality media placements that reached an estimated 520,117 people. The value of these placements is estimated at \$83,502.16. Meanwhile, during the time period of the project, the number of Washington State wineries exporting to Canada and China increased from 33 to 55. Many of exporters developed strong relationships with their importers, which led to the value of wine exported rising more than \$5 million.

### **LESSONS LEARNED**

A key lesson learned was the importance of effective planning and a strong nomination process for the reverse trade mission. WSWC began preparing for the visit months in advance, which allowed it to develop a robust agenda and select the most influential candidates in each target market. As a result, the visit was a success at advancing the interest of the Washington State wine industry.

Managing the logistics of the visit could have been streamlined in certain areas. Specifically, the WSWC allowed attendees to RSVP after its initial deadline. This led to a higher-than-expected number of participants on the reverse trade mission. In addition, the WSWC did not build in winery visits until late in the process. Winery visits are important for reverse trade missions and should have been included in the project proposal. Instead, those visits were not covered by SCBG funding.

There were no significant unexpected outcomes or results from the project. The WSWC successfully implemented the reverse trade and media missions in both markets and there was solid interest among participants. As expected, the project generated interest, distribution, and media exposure for Washington wineries in Canada and China. This is not only evident from the data that has been reported to date, but should also result in gains in the coming years as some of the reverse trade mission participants essentially become ambassadors for Washington State wine.

As discussed above, three of the expected measurable outcomes were not attained. Despite this, all three results for these outcomes were successes for the Washington State wine industry. Distribution increased 67%, while eight significant media hits were generated. Thus, the key lesson learned for WSWC is to set goals that are not only aggressive but also attainable.

### **ADDITIONAL INFORMATION**

The WSWC, along with its partner Visit Seattle, met the matching commitment to this project. Contributions totaled \$26,398.86.

For its cash match, the WSWC contributed \$9,398.86 in wine, dinner, and hotel charges that were not paid for with grant funds. For its in-kind match, WSWC staff and contractors devoted \$12,000.00 in time (approximately 120 hours in salary/benefits) to activity planning, coordination, and implementation. Visit Seattle staff devoted \$2,000.00 in time (approximately 20 hours in salary/benefits) to activity planning, coordination, and implementation, and also covered 20 hours of interpretation services valued at \$3,000.00 for Chinese guests.

## **Bill Zacharkiw: Washington needn't stand in California's shadow**

BILL ZACHARKIW, GAZETTE WINE CRITIC 04.10.2014 |



About as green as it gets. Washington State's southeastern grape growing regions, like Red Mountain, are technically deserts. BILL ZACHARIW / THE GAZETTE

For up and coming wine regions, creating an identity can be a tough slog. Choosing the appropriate grapes for a particular climate and soil can take a long time. Vines take years to establish themselves, so any change of course is a time-consuming, and costly, endeavour.

Washington State is well into this process and for the most part has done a pretty solid job. I first visited this northwestern state, which is second to California in terms of wine production in the U.S., in 2008, and left feeling pretty bullish. After spending a week there recently, I'm even more so.

I tasted Bordeaux styled blends that were worthy of the reference to the fabled French region. The Rhône grape varieties — syrah, grenache, mourvèdre, counoise, cinsault — were arguably even better, as well as being unique and interesting. The same could be said for many of the whites. I tasted some very good viognier, grenache blanc and riesling. All good, and at times, really good.

The one greyish cloud was the reliance on the state's most planted red grape, cabernet sauvignon. I did taste some great examples. But in many instances the results were excessively tannic wines that left me staring bleakly into my glass, wondering why there wasn't more of that delicious syrah, or some other Rhône styled blend.

I was reminded by a few winemakers that "nobody" in the U.S. drinks syrah: If you can't sell it, then why grow it? I would argue that it's a long-term investment, because people will eventually figure out that syrah really isn't all that different from cabernet sauvignon. Then, Washington State will be leading the way. But I don't pay the bills.

I also got a sense that there exists a bit of a complex with respect to California winemakers, who have made their name with cabernet. Despite the fact that there is little to compare the two states when talking grape growing conditions — latitude and soils in particular — I heard California comparisons uttered way too many times during my visit.

Winemakers seemed almost apologetic when talking about cooler vintages like 2011, when in fact the wines were in many cases absolutely stellar, unless of course you were looking to make a California-style wine. All too often, I felt as though many winemakers were trying to squeeze too much out of the grapes, rather than making the more elegant and finessed wines of a cool growing season.

Ultimately, it's a case of moving beyond what kind of wine you "want" to make, and accepting what kind of wine most authentically represents the land, soil and vintage. But that is coming. So while the fine tuning continues, here's what Washington State has going for it.

The vast majority of grape growing happens in the Columbia Valley, which covers 4.4 million hectares of land (about nine times the size of Montreal). Due to two coastal mountain ranges, which keep Seattle and other coastal areas drenched, the interior is starved of rain. Some sub-regions are technically deserts with less than 30 centimetres of rain per year. So irrigation is necessary nearly everywhere. But because of the lack of humidity, there is very little disease pressure.

One thing I didn't realize was that Washington State has little or no phylloxera, the sap-sucking insect that wiped out vineyards across the wine world.

This is due to the soils, which tend to be predominately silt and sand on top of basalt (hardened lava), which the little pests hate. So much of the state's vines are planted on their own roots, which puts Washington State in a very small group of wine growing regions. Is it better? When I tasted at Cayuse, one of my favourite wineries in Washington, I much preferred the wine made from the original rootstock grapes.

Washington State also has a unique mix of latitude, altitude and heat. Like many of the world's top growing regions, the higher latitude means long summer days filled with sunlight to ripen grapes. The altitude means cool nights that allow grapes to keep their acidity. Summer temperatures, however, can reach over 37C, which can make vines shut down and stop ripening.

This might be one of the reasons cabernet and merlot, which aren't heat-loving grapes, aren't always the best choice. Conversely, syrah, mourvèdre, counoise and other Rhône grapes can flourish in this climate.

One of the particularities of the wineries in Washington State is that they tend to source grapes for their wines from a number of different sub-regions. Most of the wines I tasted used the broad Columbia Valley AVA (American Viticultural Area) on the label. An AVA is much like a European appellation, though it only defines the geography of a region. European appellations rules about which grapes you can grow and deal with such qualitative issues as yields.

The most memorable wines I tasted during my trip were sourced from grapes grown solely from the smaller AVAs that make up the larger Columbia Valley AVA. The Hedges syrah from Red Mountain and Cayuse single vineyard Bionic Frog syrah from "The Rocks," are two examples of great syrah. The Ancient Lakes region is the source of some exceptional riesling, and Sleight of Hand made one of my favourites.

My favourite AVA was Yakima Valley. Located on the western side of the Columbia Valley, its cooler temperatures and higher altitudes made for some pretty elegant wines.

The Bordeaux styled blends from Fall Line Winery, Eight Bells and Côte Bonneville were phenomenal. The grenache blanc from Two Vintners was a model of finesse.

So maybe the next step is really dialing down and making more wines from the smaller AVAs to really show the character of these sub- regions. However, many already are. Here's hoping that even more will embrace what they have, because in many ways, it's pretty special.

The writer was a guest of the Washington Wine Commission. The organization did not review or approve this article.

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You can hear Bill Zacharkiw talk about wine on CHOM-FM (97.7) every Friday at 7:45 a.m.

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A few choice growths from the Evergreen State Riesling 2013, Kung Fu Girl, Charles Smith Wines, Washington State white, \$19.65, SAQ #11629787. Nice balance between riper fruit, with tropical notes of pineapple and peach. Minerality is there, subtly pumping and driving the wine. A hint of lime rind bitterness on the finish balances out the sweet fruit. Great job. Serve at 6-8C. Drink now-2016. Food pairing idea: apéritif, spicy seafood stir-fries.

Hedges C.M.S. 2012, Sauvignon Blanc/Chardonnay/Marsanne, Washington State white, \$20.20, SAQ #11035655. Sauvignon blanc dominates the blend with its blend of citrus and herbal notes. But then the chardonnay and marsanne add some richness to the finish. Easy drinking and totally dry. Serve at 8-10C. Drink now-2015. Food pairing idea: apéritif, mussels.

Riesling 2011, Eroica, Chateau Ste-Michelle, Washington State white, \$28.50, SAQ #10749681. Nice to see this wine evolve over the years. Lemony pineapple, just a hint of residual sweetness, mineral, juicy. I tasted a 2008 recently and these wines evolve nicely. Serve at 8C. Drink now-2017. Food pairing: apéritif, Thai curries with coconut milk.

Syrah 2012, Boom Boom, Columbia Valley, Charles Smith Wines, Washington State red, \$24.65, SAQ #11208561. Well named. No lack of power, but not overblown, and the fruit stays pretty fresh. Reminds me of a Crozes-Hermitage, though with darker fruit. The peppery spice, bacon, add to the depth. Oak is nicely integrated with none of that excessive vanilla. Serve at 16-18C. Drink now-2015. Food pairing idea: braised beef, leg of lamb.

Syrah 2010, Columbia Valley, L'École No 41, Washington State red, \$33.25, SAQ #10709030. Shows the fruit-driven style of western

Washington State. This is pure fruit with blackberry and dark raspberry with spice on the finish. Tannins are soft and cuddly, but with a vibrant acidity. Serve at 18C. Drink now-2018. Food pairing idea: grilled steak, pepper sauce.

Red Willow 2009, Yakima Valley, Fall Line Winery, Washington State red, \$38, SAQ #12185575. In the spirit of a Saint-Émilion, this cabernet franc and merlot dominated blend is a beautiful example of the cooler Yakima region. Despite the ripe and complex fruit, there is an underlying minerality that grounds the wine, keeping it fresh. The tannins, ripe yet grippy, give great length. Beautiful wine. Serve at 18C. Drink now-2020. Food pairing idea: lamb chops, filet mignon with spice.

# WESTENDER

## EVERYTHING VANCOUVER

APRIL 18, 2014

### CITY CELLAR: FIVE-STAR WINES FOR YOUR WEEKEND

Kurtis Kolt — Westender



1. Charles Smith 2. Franc Arman 3. Le Vieux Pin 4. Domaine Maby 5. Barda

Whether jotting notes of wines I'm tasting in a Moleskine notebook or tapping away on my iPhone, I'll usually star particular wines that I think would be good to share in this column. When I look to profile a certain grape variety, region, style or theme; they almost always slide into place. Too often though, there are a handful of starred bottles that I haven't been able to pigeonhole into a particular theme, but they hover top of mind nonetheless. This week, a handful of those wines for you, with nothing in common except being delicious, charismatic, and dinner table-worthy.

**Charles Smith 2012 Kung Fu Girl Riesling | Columbia Valley, Washington | \$19.99 | BC Liquor Stores**

Year in, year out, this is one of those wines you can always count on. Crisp and shimmering with candied lemon, grapefruit, pomelo and lemongrass. Don't dismiss Charles Smith's celebrated Riesling because the label's so fun and cheery; that's exactly the way Riesling's supposed to be. This highwire act between dry and off-dry will have you grabbing for chopsticks and anything they traditionally tuck into.

**Franc Arman 2012 'Jano' Malvasia | Istria, Croatia | \$30-ish | Private Wine Stores**

So it turns out I'm a fan of Croatian Malvasia. Who knew? The aromatic white grape in question comes from mature vines quite close to the Adriatic Sea, a short commute away from more famous Italian takes on the variety. A smattering of fresh, citrusy herbs like lemon balm and sorrel envelope Mandarin oranges and Meyer lemons with a hint of an oily richness that will have it stand up to lighter curries and similar fare. Look for it at Kitsilano Wine Cellar or 16th Street Liquor Store in West Van.

**Le Vieux Pin 2011 Syrah | South Okanagan, BC | \$22/375ml or \$45/750ml | Winery Direct/Private Stores**

I've long been a fan of Syrah in British Columbia, often earthy and layered, chockablock with blackberries, currants, pepper and sage. Le Vieux Pin champions the variety quite well vintage after vintage, and I'm loving how this year they've done a slight departure from their usual big and muscular style, towards an elegant lift and a very civilized 12.7 per cent alcohol. The result still shares hallmark complexity and nuance, but now with a little more spring in its step.

**Domaine Maby 2011 La Fermade Rouge | Lirac, Rhône, France | \$27.97 | BC Liquor Stores**

This blend of Grenache, Syrah and Mourvèdre grows a stone's throw from Châteauneuf-du-Pape and bursts with violets, lilacs, currants and Concord grapes. There's a slight dusting of dried thyme and just enough oak to lend backbone and overall structure. Smoked duck breast, charcuterie and sausage should fit alongside well.

**Barda 2011 Pinot Noir | Patagonia, Argentina | \$35-ish | Private Wine Stores**

This Pinot Noir is grown way down in Patagonia, a breezy, cool climate region that treats the grape just fine. Put big, meaty Argentinian reds out of mind, because this little lady's light, bright and lively, with silky plums, a bowl of cherries and a pinch of nutmeg to finish things off. Put in the fridge for ten minutes before opening and start to think about revving up that barbecue.

As always, if you're having trouble tracking something down or just want to say hi, find me via KurtisKolt.com (<http://www.KurtisKolt.com>) or Tweet me @KurtisKolt.

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西雅图赏酒

# taste WasHInGton in seattle

## 西雅图不醉夜



穿透森林的湿气，飞机降落在西雅图的海湾。48个小时后，我步入了“华盛顿美食节”

(TASTE WASHINGTON)的展会，排队等了十只排盘，看它们由小到大的码放在餐盘上，又是到 milbrandt 酒庄排队，让庄主帮着配了一杯冰镇的雷司令 (reisling)，手指抵着酒杯的冰

凉处，正准备享用时电话响起，友人在那头问我，“你在西雅图呢？是去生孩子的？”我只是来吃喝的，带着执着的固执。此时牡蛎的奶香溢满口腔，柔软鲜甜，带着海水的咸凉，是城中餐厅不能给予的高潮，在太平洋上磨磨叽叽飞了十多个小时，仿佛只为等待这一刻。

EDITOR 星纪生 TEXT&PHOTO 星纪生 PHOTO 百事图发源



第一家星巴克：西雅图是星巴克咖啡的发源地，星巴克的名字来源于19世纪美国文坛杰出大师 赫尔曼·梅尔维尔的经典著作——《白鲸——莫比·迪》的主人公。第一家星巴克位于派克市场内，其商标使用美人鱼的原因之一也是为了吸引渔夫们的注意。

地址：1912 Pike Place



华盛顿州美食节

TASTE WASHINGTON

一年一度的华盛顿州美食节

每年三月底在西雅图

世纪互联体育馆活动中心

(CenturyLink Field Event Center)召开。中国游客可以

通过上网订票。美食节官方

网站

<http://tastewashington.org/>

该网站除了可以预定入场券

之外还能预定专业美食美酒

的讲座。活动地点：西雅图

世纪互联体育馆活动中心。

#### ◆ 星巴克

鲜少有人为满足口腹之欲来美国。这片土壤长满了圆头圆脑的植物，超市里尽是敦厚的鸡腿牛肉，冰淇淋按加仑出售，人们轻易捕到悠游于深海的大鱼。传统美餐在许多人的眼里都缺乏层次，仿佛这群飘洋过海的清教徒只流连食物的嚼劲，丝毫不在意其间的化学反应。

但西雅图好像是个异数。它那点缺乏日光的颓废太似中国的四川盆地。在四川，人们靠耍着法子的吃辣来抵御湿气；在西雅图，人们设计了从最潮冷的海边起，蔓延到整座城的无死角星巴克咖啡网，用每隔十步的门店，用咖啡来驱寒。

西雅图人的血液里也一定透着咖啡的气味，那些在雨中从不撑伞的行人，手中都攥着一杯星巴

克——湿冷也没那么可怕了。门店的密度就像鲁班设计的避雨亭，很少人真有功夫去避雨，但它的温度就是城市的温度，它的灯光透过街巷交织成网络，维系人们脑耶的活力，激发他们造出波音大飞机，玩出现代摇滚乐。Pike市场至今仍保留着据说全世界第一家的星巴克门店，店口门楣上的美人鱼标志也沿用最初的那一枚——咖啡色作底，两条尾巴摆开来。小小的店堂总是人满为患，对面就是渔市。每天早上，金枪鱼、鲑鱼、墨鱼鱼游满了冰柜，带着海底两万里的气息。

西雅图的活力正是来自它挥之不去的湿气，任凭星巴克热动全世界，必须在蒙蒙细雨中，必须迎着海上的雾，喝一口咖啡，不计较味道，却足以领会城市精神。

#### ◆ 赏味华盛顿州

3月底的西雅图，春光会惊现一小会儿，每天总有半小时，通常在下午或是傍晚，阳光从海面划入与第一大道垂直相交的巷子里，陡然发现，街上的行人也比往常多一点，这另有原因，这座森林雾都的胃正悄然翻腾着，一年一度的“华盛顿州美食节”(Taste Washington)拉开帷幕。西雅图的胃口可不容小看，两天里来自华盛顿州200多家葡萄酒庄、65家著名的餐厅，以及城中有头有脸的美食鉴赏家、顶级名厨齐聚城市西方南大街的世纪互联体育馆。

毫不夸张的说“美食节”将城市的美食地图，华盛顿州的美酒地图浓缩于展会现场。游人们只需凭着票在入口处领取属于自己高脚酒

杯和餐盘，就可徜徉在这张餐盘酒的立体地图上，自由搭配。餐盘的设计正好挂住酒杯，人们得以腾出手来选酒、挑食、摆盘。对于旅行者来说，这是通往华盛顿州味蕾的捷径，无需大费周折从海量地攻略中剔除那些“游客餐厅”，偌大的展厅就是西雅图的胃！那些藏在街巷深处让本地人津津乐道的巧克力屋、苹果派店、知名女大厨低调经营的小海鲜馆，如果按图索骥地找，得花多少功夫，遇上美食节全大方地摆出摊位，耍出绝活。大厨们亲自坐镇，一边做饭一边与食客聊天，餐点都制成“迷你份”，没办法，太多美食在沸腾，胃里装不下的也要用眼睛狠狠吃一遍。





#### ❖ 牡蛎之约

刚从码头运来的新鲜牡蛎让人大饱口福。牡蛎的摊位上，十几米的展台站了7、8个工作人员，马不停

到壮年肥硕的——码在餐盘上，然后拐入酒展的柜台。捧着一盘牡蛎的架势实在壮观，于是一路被热情的酒庄庄主拦下：

“牡蛎！”有人惊叫，“要配我们

华盛顿州的葡萄酒产区 华盛顿州主要的“美国法定种植区”(AVA) 包括亚基马AVA、沃拉沃拉AVA、哥伦比亚山谷AVA、普捷湾盆地(Puget Sound)

蹄地开牡蛎。他们带着手套，用刀划开贝壳，动作干净利落，软体动物的奶香弥漫在整个角落。人们彬彬有礼，排到了就伸手拿一只，挤点柠檬汁，一口吃掉，一个种类就尝一只，其余的份额要留给后面的食客，这仿佛是一条不成文的规定。不解馋的人会重新排队，排到了依旧每种只拿一只。有的牡蛎狂热者循环排队吃了一天，估计晚上睡觉都会带着海水味的鼾声。

我是酒鬼，当然不会错过这样的机会。所以并没像别人那样，抡起一只马上干掉，而是把搜集好7、8种不同的牡蛎——从三个月大的

❖ 好酒

作为红酒产区，华盛顿州产区靠近加拿大，是北美的高纬度寒冷之地，在主要生长季节的日照时间平均每日要比加州多出2小时。平均17.4小时的日照时间，温和的气候使葡萄得以完全成熟，而温度较低的夜晚使得果实中酸度较高。比起加州的napa酒“饱含情欲”的果味，华盛顿州产区简直文艺坏了。雷司令清丽，赤霞珠高酸度，香气丰腴口感平衡。

在“华盛顿美食节”(TASTE WASHINGTON)我真是大开眼界。整个州的葡萄酒人从山谷里驱车而来，在西雅图南大街800号体育馆摆出自己的摊位，热烈讨论着种植和酿造。这里的酿酒师们大多穿着格子衬

家的长相思！”

“我这里有绿皮诺，也不错，要不要试试看？”

我最终选了一款雷司令，躲到会场边的餐桌上慢慢享受。这是一顿朴素又惊艳的牡蛎大餐，新鲜度警醒大脑，咸味和矿物感相处融洽。略带海盐的柔软真适合与雷司令的冰甜交织啊！Milbrandt酒庄的雷司令种植于哥伦比亚谷的高地斜坡上，酸度高，口感通透。我咂了一口，意识到自己坐在北纬47度，西雅图市南大街800号，舌尖上涌起又散去的不是牡蛎和冰白，而是皮吉特湾的海水和哥伦比亚谷的砾石。

衫牛仔裤，大多子承父业，自小学酿酒，其他兄弟姐妹则负责市场、销售。这种家庭式酿酒传统竟然得益于美国1920年禁酒时期的法令。即使如今在华盛顿州Milbrandt这样的大型红酒公司，引进了技术人才和专业市场运营模式，但它们的核心成员依然是家族。展会上我遇到三个年轻人，一起创立了名为Sleight Of Hand的酒窖。每年产量大概也就够分亲朋好友的，却兴致勃勃地为新酒的品鉴制作了一张CD。酒标是一个诡异的印度人像涂鸦，呼应了几百米外的西雅图音乐博物馆里Jimi Hendrix画像上错愕的神态。

IT和摇滚乐是西雅图的肋骨，咖啡是它的血液，红酒却把青春的棱角都酿了进去。

AVA、红山( Red Mountain)

AVA和哥伦比亚河谷( Columbia Gorge)AVA。以上种植区都具有其独特的气候、土壤和地理特征，其中，哥伦比亚山谷是比较著名的一个AVA，当地的夏季气候温和，温度适中，白昼较长，夜晚凉风习习，如此温和的天气中诞生了华盛顿最杰出的一些葡萄酒品种。

西雅图的美食

RN74

<http://www.michaelmina.net>

Theochocolate

<https://www.theochocolate.com/locator>

com/locator

Salty's Seafood Grill

<http://saltys.com>

西雅图美酒

1.Ste.Michelle

[https://www.ste-](https://www.ste-michelle.com)

michelle.com

2.Milbrandt

[http://www.](http://www.milbrandtvineyards.com)

milbrand

tvineyards.com

3.Hedges Family

Hedges

[http://www.](http://www.hedgesfamilyestate.com)

hedgesfamilyestate.

com

## BEST CHOICE 贪杯

## 一杯酒与一座城市

撰文 薛晓晨



摩尼朱 Monica Zhu

WinePost 葡萄酒杂志联合创始人, WSET 一级品酒师, 葡萄酒及葡萄酒文化爱好者, 乐于探索葡萄酒与生活的创意生活方式, 寻找葡萄酒与内外世界的联系。

## 喝

美国 NAPA 产区的酒在让我着迷不起。NAPA 酒在中国的定价当然会高, 自有其理——它贵, NAPA 酒通常表现出来的圆润、甜美、“膨大无脑”, 换作另一位成熟多金男来看也许便成了“风情万种”, 声名显赫的美国 NAPA 酒市准富贵之气, 横贯其酒都如狂飙电影, 一种做世界主角的气氛, 我曾以为那就是“美国酒”的代名词。3 月底的西雅图之行彻底改变了我的看法: 美国西海岸酒域之广, 使红酒的风味复杂万端, 除了 NAPA 熟葡萄自家产的“最贵酒庄”被运到世界各地, 其他产区则基本只能满足本地需求, 很少出口, 也就意味被默默无垠。

华盛顿州就是一个美丽的产区, 我飞赴西雅图, 参加一年一度的“华盛顿美食节”(TASTE WASHINGTON) 真是大开眼界, 整个州的新葡萄酒人从山谷里驱车而来, 在

西雅图南大街 800 号体育馆摆出自己的摊位, 热烈讨论种植和酿酒, 本地的酒农、品鉴家、侍酒师齐聚一堂, 他们可不高兴模仿法国那一套——这些西海岸的葡萄酒农, 定要玩出与西雅图精神契合的葡萄酒, 像智利的风向、针叶林的气息成就了哥伦比亚谷的葡萄酒——不是德国葡萄酒那种决绝的酸, 倒有几分浪漫, 仿佛就是《西雅图不眠夜》里的嬉嬉笑笑, 浪漫、平和、高个、微醺的鼻尖闪着星光, 流行乐也被注入红酒, 舞会上我遇到三个年轻人, 创立了名为 Slight Of Hand 的酒庄, 每年产量大概也就几十万瓶, 却兴致勃勃地为新酒的品鉴制作了一张 CD。

赤忱和热血, 自由与认真, 即使西雅图没有足以长出葡萄的 Chateau (古堡), 散落的葡萄园 (Walla Walla Valley) 总是沐浴在日光下, 我于是不动声色, 还有那与本地美酒们同呼吸的, 华盛顿州酒就是华盛顿州的酒!



Milbrandt Whispering Tree Cabernet Sauvignon 2009

这款红来自华盛顿州南部哥伦比亚谷 Milbrandt 酒庄, 以赤霞珠为主混酿梅洛和品丽珠。圆润的气候造就了柔和、丰润的口感, 酒体色泽深红, 含有车厘子、红樱桃和草莓的香气, 红酒在橡木桶陈酿 6 个月, 入口饱满、圆润、平衡感好, 丹宁柔和, 建议醒酒 30 分钟饮用。Milbrandt 酒庄的釀造师同样令人惊艳, 酒庄秉承家族传统, 他们的名言即是: 作为农民, 没有什么比从源头控制品质和风格的产品更令人激动的!



Hedges Family Estate Red Mountain 2010

Hedges Family 酒庄比本地其他酒庄, 最突出的还是法国血统。创始人中有一位法国女士, 如今第二代传人酿酒却是她的女儿。这个红山 (Red Mountain) 系列个性鲜明, 是 Hedges 家族用赤霞珠和梅洛进行混酿而成的。红山是哥伦比亚谷的子产区, 它占尽优势, 日照时间比纳帕谷还要多, 日夜温差也很大。这个系列全部采用红山种植的葡萄, 酿造和装瓶都延续了法国葡萄酒的传统风格, 口味也尽量往经典和优雅的风格上靠。

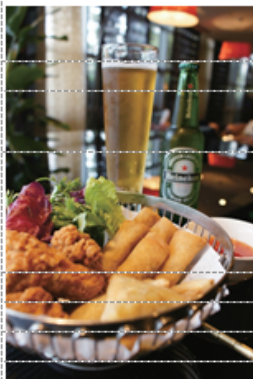


Michelle brut rose Columbia valley

这款酒称得上是西雅图人的“香槟”, 产自华盛顿州的葡萄酒大产区 Michelle 酒庄。葡萄的产地位于哥伦比亚谷高纬度的凉爽地区, 自然条件与法国香槟区很像, 因此赋予酒体良好的酸度。陈酿了 18 个月的粉玫瑰酒, 喝起来有明显的果味, 刚入口的时候有点干, 口感柔和, 然后果味才涌上来。这款粉玫瑰酒出自酿酒师 Rick Casqueiro 之手, 他是擅长酿起泡酒, 是一位学院派酿酒师, 懂得用科学来严格控制酒度, 因此这款粉玫瑰酒, 你会觉得干爽, 但缺乏气泡感。

## FOOD TALK 美食情报

## 和球迷一起享美食



4 年一遇的足球盛宴, 32 支球队

最强国家队争夺大力神杯, 你要怎么狂欢? 眼下,

上海外滩嘉喜来酒店 6 月 12 日至 7 月 14 日推出了只需 100 元的

“狂欢世界杯套餐”, 届时大堂酒吧双面大屏实时转播, 喜力

啤酒尽情畅饮。

并搭配炸鸡、炸薯条及咖喱鱼等精美小食无限供应, 还有墨西哥的、经典巴西鸡尾酒、巴西芒果鸡尾酒、蓝色多瑙河等鸡尾酒可供选择。此外, 为了让客人们享受这一狂欢时刻, 酒店还特别推出世界杯竞猜互动活动之“竞猜角 赢大奖”活动。爱足球的你如果不愿意宅在家里自己对着电视看球, 不如加入和球迷们一起狂欢的队伍。上海外滩嘉喜来酒店毗邻港口, 景色优美, 还有自然采光、口味最佳的游泳池、世界杯期间, 不妨到此一游。详情致电: 021-31219999 转 6331。

## 去户外餐厅享受夏意



有餐厅属于夏意, 上海浦

东嘉里大酒店全新概念户外餐厅 The PATIO 最近

是其一。今年夏天它全新开业, 餐厅毗邻浦东嘉里城中庭, 舒适

的装修风格, 提供特色鸡尾酒与美食, 是和家人朋友度过一段惬

意的休闲时光的

好地方。除了清凉的手工自酿啤酒, 3 升装的巨型鸡尾酒、鲜榨果汁、“派对时光”套餐, 还有“不妨一试”的西瓜作伴, 这些都可以在 The PATIO 区的酒水单上找到。另外还有一系列美食, 包括广式点心、烧腊串、意面和汉堡、汤面及素食餐。浦东嘉里城中庭的活动多姿多彩, 有小型市集、儿童互动游戏、音乐节等, 都将为 The PATIO 的客人带来更丰富的用餐体验。

详情致电 021-61698886。

## 人参鸡汤配寿司



上海嘉里万豪酒店的蒸川餐

厅新近开放, 每

厅以日式菜系为主, 店内采用自

然原水, 中性色和暖绿色系配搭, 非常和谐。两间私人包间设

有铁板烧, 现场

烹制的美味配以

各式清酒品菜及

上宾葡萄酒, 每

厅的寿司则别具

风格, 每天新鲜出品各色刺身及寿司, 地道精致烧

利用天然木炭作燃料, 金箔点缀且兼具自然原味。

韩国烧肉配有四川特色烧腊及传统酒饮料——烟

椒粉, 而所有晚餐均奉上两款大厨当日精选配菜, 人

参鸡汤更是 6 年白参、原只鸡、糯米、红枣和栗

子等食材, 经 6 小时熬制而成, 味道浓郁无比。新开业

的上海嘉里万豪酒店由国际知名室内设计公司 Hirsch

Bedner Associates (HBA) 打造, 设有多个餐饮, 其

中, 全日餐厅都会尚雅呈献世界各地美食, 而万豪中

餐厅主打正宗时令菜和太板菜, 而大堂吧则结合高

级下午茶及夜晚的鸡尾酒。

# 西雅图的胃

穿透森林的湿气，飞机降落在西雅图的海湾。48个小时后，我步入了“华盛顿州美食节”TASTE WASHINGTON的展会。排队要了10只牡蛎，将它们由小到大的码好在餐盘上，又晃到millbrandt的酒庄摊位，让店主帮着我配了一杯冰镇的雷司令(riesling)，手指抵着酒杯的冰凉处，正准备享用电话时呢，友人在这头问我：你在西雅图吗？是去生孩子的？

文 庫 尼 生

96 微视餐厅评论

## h Travel 旅游

### 赏味华盛顿州

[illegible][illegible]

## 牡蛎之约

[illegible][illegible][illegible][illegible]

其由主體與客體之相互作用而產生。

我

只是来吃席的 带着热情的尊敬。

我 此时牡蛎的奶香溢满口腔，像奶油甜，  
有海风的凉意，这被吐出了个多小时的海  
鲜，在大平海上海腐肌叫飞了十多个小时，你只以为第  
待这一刻。

## 星巴奇的故乡

很少有人为满足口腹之欲来美国。胶片上生长满了异国风情的植物。超市里尽是肥美的鸡鸭牛肉。放送淋淋沥沥出售。人们轻易得到悠游于深海的大鱼。将美国在许多人的眼里都缺乏层次。仿佛这部翻译过来的清教徒只流连于食物的诱惑。似乎不在意其中的化学反应。然而我却好像是个例外。

但西雅图好像是个三教。

它所占领土比光的面积大似中国的四川盆地。在四川人们靠着着法子吃的比其它任何国家。在西伯利亚人们设计了从很寒冷的道路把食物送到新城市的无光食品巴拉克等项。用铁板十秒的门店。用铁板来做饭。

西塘诱人的血液里化一窝浓香咖啡的气味。那些

在雨中且不撑伞的行人手中都捧着一杯风干——  
 冰冷也没那么可怕了。门店的态度就像每道设计的  
 菜单，很少人真会功夫去钻研，但它的温度就是城市  
 的温度。它的灯光通过街景交织成网络，维系人们脑部的  
 活力，激发他们想出波音飞机，玩出时代摇滚乐。

Pike市场至今仍保留着据说会世界第一家的星巴克门店。店门口挂上的美人鱼标志也沿用最初的那一枚——金黄色作底，两条尾巴摆开，小小的店就总是人满为患。对面就是渔市，每天早上，金枪鱼、鲑鱼、鲱鱼、鳕鱼被冻了冰箱，带着海盐与万里的香气。

致让人突然惊醒。而像雨滴的活力正是来自它得不  
去的湿气——酒楼的冰窖和松针的呼吸，以及枝头  
上阳光闪闪的舞会。在晨星已忘却全世界，在如四川  
人用泡椒、野山椒、干辣椒、朝天椒“带辣”了川外的平原  
和高原，从烘烘的混合上夹来，辣椒已气喘吁吁不上套也  
肉麻的引诱，但最让人逗乐的还是“吃火锅动锅铲”。

必創在離離酒海中 必創道着海上的城 喝一口酒  
醉 不計於非非 也足以領合城市精神。

www.imoshan.com 97

本页顺时针依次为：意大利  
利基乐满铁器厨柜店、意  
文化韵、Banchemo意  
80年历史的老字号、厨师正  
代表印章、印坊：就铸狂人  
炫祖、流行的多是他店口味、  
!!!!!!

**华盛顿州美食节**  
(TASTE WASHINGTON)  
一年一度的华盛顿州美食节每年三月将在西雅图世纪中心举办庆祝活动。  
(CenturyLink Field Event Center) 届时, 华盛顿州美食研究会 (Taste of Washington) 将邀请来自全美各大知名餐厅的美食家举办活动向人们展示人们需要品尝一些来自西雅图地区、美国其他地区和国外的故事, 品尝各种美味海鲜、800 多种红酒、干葡萄酒等美食。活动于每年 2015 年 3 月 28 日至 29 日。

中国游客可通过网上预订美国美食节有限席位: <http://tastefest.washington.org/>。不同品牌除了可以预定入场券之外还能预定专业美食家点评的讲座、烹饪体验、葡萄酒品鉴和音乐活动。2010年今年的普通单日票价 80 美元，普通双日票价 125 美元，VIP 单日票价 145 美元，VIP 双日票价 185 美元。VIP 票可以享受提前入场、以及 VIP 专享座位权益。

### 第一家星巴克

这集小说是巴恩斯写的早期作品，原书巴恩斯的名字来源于19世纪美国文坛杰出大师赫尔曼·梅尔维尔的匿名著作——《白鲸》——屠比·拉蒙特的主人公。据一家网站巴恩斯的家谱网站内，以推测出他的家族受到耶稣后为纪念，因此就提出耶稣的家族谱上耶稣跟巴

除了了解本地市场的竞争,制定品牌定位外,不仅要有最基础视觉识别的LOGO,还要有标志性的颜色与内容,这样才能塑造一家星巴克的店本,只是模仿从第一家星巴克买到的咖啡杯,到世界狂一家星巴克店也可全套制作出来。

98 精英餐厅评论





Wine and food pairing dinner.



Visit to Columbia Crest winery.



Visit to Milbrandt Vineyards winery.



Visit to Milbrandt Vineyards winery.

### **CONTACT INFORMATION**

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**Project Title:** USA Pear Show in China

**Partner Organization:** Pear Bureau Northwest

### **PROJECT SUMMARY**

After 20 years of efforts by the pear industry, Northwest Horticultural Council, and USDA APHIS, market access to China was granted for the first time for USA Pears in January 2013. Because Chinese consumers are accustomed to the crisp Asian pear varieties, the Pear Bureau was faced with introducing USA Pears as a new product to the market, with the top constraint being the lack of consumer awareness regarding the multiple varieties available, flavor attributes, nutrition information, and ripening attributes of USA Pears – addressing the constraint will continue to require a lot of education. USA Pears – or western pear varieties – are very different in taste, appearance and eatability (i.e. western pears need to ripen) than the Asian pear varieties grown in China. Therefore consumers may not have ever seen a western pear variety and it is considered an exotic fruit to them.

The USA Pear Road Show in China capitalized on the timing of the market opening to take advantage of the opportunity to kick off the second full season in the market. On top of the Pear Bureau's existing plans and promotional activities for the season – which included in-store promotions, public relations, and technical trade assistance – the extra push provided by the Road Show generated interest, enthusiasm, and excitement for both consumers and retailers. The Road Show was a focal point of the Pear Bureau's promotional program and initial launch into the Chinese market. It also served as a demonstration to the trade of the Pear Bureau's dedication to providing promotional support in the market.

### **PROJECT APPROACH**

The opening ceremony for the USA Pear Road Show promotion in China was held on November 15, 2014 in Beijing. By the end of the activity on January 28, 2015, 55 promotion days were completed in Beijing and Shanghai at 20 locations of participating retailers including Sam's Club, Yi Tong Long, Bei Chen, Jenny Wang, Aeon, RT Mart, Nong Gong Shang, E-Mart, CenturyMart, and Walmart.

The first stop of the truck's mobile showcase was the Sam's Club located in Shijingshan district of Beijing. An inauguration ceremony was organized and officiated by representatives from the Pear Bureau, Sam's Club, and the US Embassy in China. Several thousand consumers visited the Road Show and over 3,000 samples were distributed in the opening weekend alone. Media also attended the event and press briefing that followed.

Approximately 60,000 Chinese consumers sampled USA Pears over the course of the promotion. In addition to singing and dancing performances (paid with matching funds) that helped attract consumers' attention to the Road Show, the most popular activity throughout the period was the USA Pear Coloring Activities. Over 5,000 children with their family members participated at the activity throughout the show period. Over 90,000 USA Pear leaflets were distributed to Chinese consumers and the Road Show video was exposed to approximately 150,000 consumers. The Road Show generated good media exposure through PBNW's public relations efforts in China. The event was also featured in the USA Pears Newsletter distributed to the fruit trade in the country.

Participating retailers were pleased to have participated in the events to promote USA Pears, with many commenting on the innovative approach of PBNW in conducting such an activity in China – the first of its kind among all imported fruit to organize a large-scale, open-air activity outside their stores in Beijing and Shanghai.

The consumer evaluation was conducted via a total of 180 face to face interviews completed at the Road Show venues between November 16 to January 14 in Beijing and Shanghai. Consumers were randomly interviewed immediately after they sampled USA Pears on the spot to collect their opinion and preference regarding USA Pears, if they will purchase USA Pears in the future, which household members consume USA Pears, if parents will feed USA Pears to their children, their rating of the USA Pear Road Show, etc.

The Pear Bureau's representative in China, Louis Ng & Associates (LNA) oversaw the day-to-day development and implementation of the activity, negotiated with retailers, coordinated the promotional schedule, and supervised the agency executing the promotions.

The Pear Bureau home office had an oversight and project management role in the activity, approving the selection of the promotional company, truck design, and retail partners. PBNW worked closely with LNA to manage the budget and on reporting for the project.

This project did not benefit any non-specialty crops.

## **GOALS AND OUTCOMES ACHIEVED**

The Road Show promotions had a direct impact on the performance measure results, educating consumers about the attributes of USA Pears and influencing their purchase decisions. Throughout the promotions, the Master of Ceremonies introduced USA Pears to the audience and explained USA Pear varieties, availability, ripening characteristics, and recipe usage ideas. Demonstrators distributed leaflets with key information and provided the opportunity for consumers to sample ripe USA Pears. A USA Pear video also played throughout the promotions. The children's coloring contest kept families at the promotion for an extended period of time, maximizing their exposure to USA Pears.

After just 2.5 years of market access, USA Pears are still new to the China market. The Road Show activity served as a way to generate excitement for the product and introduce USA Pears to both consumers and the trade. The positive results of the expected measurable outcomes demonstrate the vast potential for continued growth not only in the featured cities of Beijing and Shanghai, but throughout the country.

PBNW's strategy for the Road Show was to conduct an activity that could introduce USA Pears to consumers on a large scale and provide promotional support to retailers to encourage the trade to increase their volumes of USA Pears. The Road Show achieved these goals, and in some cases, exceeded expectations: an estimated 120,000 consumers visited the 55-day promotion, with 60,000 samples being distributed. Retailers reported an average of 80.31% sales growth for USA Pears during the promotion. Export volumes for the two-month period were nearly triple the initial target.

In order to evaluate progress towards the achievement of the Road Show targets, 180 consumer interviews were conducted onsite during the promotions in Beijing and Shanghai. Results were as follows:

	<b>Target</b>	<b>Result</b>
A. % increase of Northwest Pear sales during the promotional period over the previous sales period	50%	80.31%
B. % of consumers who purchased USA Pears for the first time after the Road Show	5%	17.91%
C. % of consumers who consider health and nutrition important purchase decision motivators	10%	11.5%
D. # of consumers who became more educated about Northwest pears after staying 1-2 minutes	35,000	35,000
E. # of consumers who became more educated about Northwest pears after staying longer than 2 minutes	13,500	50,000
F. # of children who became more educated about Northwest pears during school promotions	6,500	N/A
G. % of more educated consumers who reported that the information will influence their purchase behavior positively to buy more USA pears	5%	76%
H. USA Pear exports for the promotional period (mid-November 2014 through mid-January 2015)	33,000 boxes	96,512 boxes

## **BENEFICIARIES**

The Oregon and Washington growers and shippers of USA Pears are the beneficiaries of this project and the further development of the China market as a top export destination. The Road Show activity succeeded in reaching a large number of consumers with USA Pears' educational message, with 76% reporting that the information provided will influence their purchase decisions and 17.91% of purchases during the promotion period being new customers.

Activities with this type of broad reach are essential to continue to develop the Chinese market and maximize growth in a market that has potential to become a top 3 market for the industry. PBNW anticipates that export volumes to China will surpass 500,000 boxes in the next 3-5 seasons.

During the 2014/15 season, Russia – formerly the 3rd largest market for USA Pears – closed the market to U.S. products. The industry turned to China and other export markets to increase their volumes and fill the void left by an over 450,000-box market. In addition, the West Coast port strike delayed shipments during a key period of USA Pears' window in many export markets. In spite of these challenges, the Global Trade Atlas shows that China imported 204,750 boxes of USA Pears worth \$4.8 million during the season, and the overall average price per box for the season's exports reached the second highest level of \$22.66. The USA Pear Road Show and PBNW's promotional support inspired confidence in the trade to handle increased volumes of USA Pears.

## **LESSONS LEARNED**

PBNW experienced challenges in the timing of the Road Show, learning to anticipate unexpected issues arising in the Chinese market. While the kickoff event was initially planned for early November, the APEC meeting November 10-11 in China created a delay because of restrictions and measures in Beijing due to the number of Presidents and Heads of countries visiting. As a result, the start date of the Road Show was postponed to November 15.

In addition, due to the new rules launched by the Beijing government in April 2014, trucks that are over 5 metric tons are not allowed to enter the 5th Inner Ring Road of the city of Beijing. Nearly all of the planned Road Show venues were located within the 5th Inner Ring Road. Therefore, a smaller truck had to be secured for the events. The deposit for the initial truck rental was transferred towards the new truck. The initial designs were adapted to the new truck's specifications. In addition, it was negotiated to get two free big outdoor tents for the Road Show with tables and chairs.

The weather conditions and smog pollution were also a challenge for an outdoor activity. Due to the delayed kickoff, the promotion was pushed into mid-January, when weather turned colder and smog warnings increased. PBNW plans for future activities in the region to take place in October and November for improved weather conditions.

PBNW also learned that activities attracting kids and families are key elements to a successful promotion. In spite of weather and smog issues, an estimated 45,000 participated in the children's coloring contest, which kept families engaged and provided PBNW a more extended period to communicate information to the consumers.

## **ADDITIONAL INFORMATION**

Project Cash Match: \$18,919.88

Video clips and photos are available in the following link:

[14-15 Road Show Photos and Videos.zip](#)

## **CONTACT INFORMATION**

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**Project Title:** Market Research to Support Blueberries to Asia

**Partner Organization:** Washington Blueberry Commission (WBC)

### **PROJECT SUMMARY**

Washington blueberry growers and exporters need detailed information on the market for blueberries in Korea, China, and India. These Asian markets are likely to be important outlets for Washington's growing blueberry production in the years ahead, but without detailed information on distribution, importers, retailers, handling and storage, competition, consumer purchase behavior and other factors, the WBC is not in a position to choose where to invest its own resources in market development and promotion.

The project is timely because Washington blueberries are likely to soon gain access to these new markets. In Korea, other U.S. states have access and have started shipping product. Oregon was the first and year one exports of Oregon fresh blueberries to Korea totaled approximately 500,000 pounds. The recent implementation of the U.S.-South Korea Free Trade Agreement has given a boost to these market access requests. Based on Oregon's experience, Washington recently requested to be added to the list of states eligible to ship blueberries to Korea and the WBC expects to receive approval within the year. (IMPORTANCE). Washington does not have market access to China as yet, but expects that market to open within a few years. And with ongoing negotiations for the Trans Pacific Partnership agreement likely to come to fruition within a year or two, there could be a real opportunity for market access in Vietnam. All three are solid markets for other U.S. fresh fruits and vegetables and should offer tremendous opportunity for Washington's blueberry growers. The WBC prefers to approach new markets with research studies first. Formal research will increase the likelihood that WBC and its members enter each market successfully. Researchers can assess potential import, wholesale, and retail partners to determine the most suitable trade partners for Washington blueberries. Similarly, the research can help identify the most effective promotional tools for each market. The health benefits of blueberries will likely be a major emphasis of future WBC promotions in all three markets but how best should the WBC convey health benefit messages?

This project does not build on previously funded work.

### **PROJECT APPROACH**

The Washington Blueberry Commission completed activities related to this project over a three-year period. Activity commenced in 2014 with research and a market visit to China. A second market visit to China occurred in early 2015 and the final report on that country was delivered in May 2015.

The second study (on India) began following completion of the China project. A market visit to India took place in October 2015 and the study on that market was delivered at the end of the 2015 calendar year.

The third research project (Korea) was initiated in early 2016. A market visit to Korea took place in March 2016 and the final study on the Korean market was delivered in June.

For each market study, the Commission's work included:

- a. Desk research – a contractor conducted desk research on each market for blueberries. That research included an examination of domestic production, consumption, imports and exports, consumer trends, market access, and other factors. Sources for this effort included the Global Trade Atlas, USDA/FAS Attaché and GAIN Reports, U.S. Commercial Service reports, the CIA World Factbook, the Food and Agriculture Organization, and a variety of other online trade and consumer publications. For information related to blueberry market access, the researcher consulted the USDA's Phytosanitary Issuing and Tracking System (PCIT), World Tariff, and the GlobalMRL database. That last system was used to develop a report on pesticide maximum residue level gaps and regulatory discrepancies that could affect U.S. blueberry exports.
- b. Market visits – For each country study, desk research was followed by market visits that included blueberry industry representatives from the state. Meetings were held with leading importers, wholesalers, retailers, food manufacturers and government officials covering fresh fruit, dried fruit, frozen products, and processed ingredients. Cities targeted included Shanghai, Beijing, and Guangzhou in China, New Delhi and Mumbai in India, and Seoul in Korea.

The research studies and market visits all confirmed that opportunities exist for Washington State blueberries in each market. However, the scope of opportunity varies by market and product. In China and Korea, trade opportunities for Washington blueberries will improve greatly once market access is secured for fresh berries. The availability of fresh

blueberries from Washington would likely strengthen awareness of Washington as a blueberry supplier and reinforce demand for frozen and dried product.

In India, Washington State is already able to ship fresh blueberries but the logistics are a challenge to ensure product freshness and quality. That market appears to offer greater immediate potential for frozen and dried product. These and other findings are detailed in the final reports delivered for each country.

Industry members and in-country contractors played significant roles in each country study. As mentioned, a delegation of industry members accompanied researchers to each country for market visits and trade meetings. These included:

- Brenton Roy – Oasis Farms (fresh, organic blueberry grower)
- Terry Dorsing – Royal Ridge Fruits (fresh and processed blueberry supplier)
- Alan Schreiber – Washington Blueberry Commission
- Rebecca Weber – Washington State Department of Agriculture
- Steve Mowat – Washington blueberry broker/exporter

Researchers also relied on in-country contacts for assistance with trade meeting arrangements and logistics. These partners included:

- LiHai Dong (China) – Washington State Department of Agriculture representative in that market
- Danny Kim (Korea) - Washington State Department of Agriculture representative in that market
- Devna Khanna, i2i Group, India – Western US Agricultural Trade Association representative in India.

The scope of the project only benefitted blueberries.

## **GOALS AND OUTCOMES ACHIEVED**

For each country study, the project consisted of the following activities:

- a. Desk research – a contractor conducted desk research on each market for blueberries. That research included an examination of domestic production, consumption, imports and exports, consumer trends, market access, and other factors. Sources for this effort included the Global Trade Atlas, USDA/FAS Attaché and GAIN Reports, U.S. Commercial Service reports, the CIA World Factbook, the Food and Agriculture Organization, and a variety of other online trade and consumer publications. For information related to blueberry market access, the researcher consulted the USDA's Phytosanitary Issuing and Tracking System (PCIT), World Tariff, and the GlobalMRL database. That last system was used to develop a report on pesticide maximum residue level gaps and regulatory discrepancies that could affect U.S. blueberry exports.
- b. Market visits – For each country study, desk research was followed by market visits that included blueberry industry representatives from the state. Meetings were held with leading importers, wholesalers, retailers, food manufacturers and government officials covering fresh fruit, dried fruit, frozen products, and processed ingredients. Cities targeted included Shanghai, Beijing, and Guangzhou in China, New Delhi and Mumbai in India, and Seoul in Korea.
- c. Analysis and Reporting – following the market visit, the research contractor analyzed all collected data, including market access and MRL reports, to determine findings related to market opportunities, challenges, and risks. The findings were detailed in a comprehensive market report per country.

The original grant proposal included the following Expected Measurable Outcomes:

The **goal** of this project is to provide research that enables the WBC to develop an export market development strategy in key Asian target markets. Ultimately, success will be determined by increased exports.

Washington state blueberry producers do not currently export to any of the three markets targeted with this project. Therefore the **benchmark** for export sales value to each market is \$0. By the end of the three years of the project, Washington blueberry exports will exceed \$1,000,000 in value to Korea, \$2,000,000 in value to China and \$200,000 to India. These value figures represent the **target**.

Progress has been made toward these export goals though precise export figures for the start are difficult to obtain. Blueberry exports are recorded at the national level and will combine figures for all exporting states. However, Washington and Oregon are market leaders for export of frozen and dried blueberries to Asia. When looking at recent trade statistics through the Global Trade Atlas and USDA GATS, the following exports have been recorded:

China – US frozen and dried cultured blueberry exports to China have exceeded \$2,000,000 combined over the last three years. For 2016 year to date on dried blueberry exports alone, the US has exported over \$1.1 worth of product (GATS). It is estimated that Washington may account for about one-third of those exports.

India – The United States exported over \$200,000 worth of dried and frozen blueberries to India in 2015. Nearly all of the exports were of dried blueberries. However, exports have been steadily increasing over the past five years. It is estimated that Washington may account for about one-third of those exports.

Korea – The United States exported over \$14,000,000 in frozen blueberries alone to South Korea in 2015, nearly tripling exports of this commodity since 2011. Exports of dried blueberries to Korea totaled over \$4.8 million in 2015. Again, it is estimated that Washington accounts for about one-third of those exports.

While Washington State has not likely met the export targets set out at the time of the proposal, blueberry exports from the state to each target market appear to be increasing. This would grow further if fresh market access for blueberries is obtained in China and Korea. At the time of the original proposal it was hoped that market access for Washington fresh blueberries would have been secured by this date.

The goal for the project, as stated above, was to “provide research that enables the WBC to develop an export market development strategy in key Asian target markets.” The WBC believes that this goal was met. Three comprehensive research studies were completed that helped the Washington blueberry industry connect with buyers in each market and furthered an understanding of market opportunities. Several trade leads were generated as a result and it is likely that some new business for exporters has been secured. Ultimately, significant export growth will likely still hinge on securing market access for fresh blueberries to China and Korea which would allow Washington suppliers to compete with other origins in those large markets. While fresh access is prohibited, Washington blueberry exports are constrained.

	Baseline 2013	Goal 2014-16	Outcome 2014 -16
China	~\$285,000 in dried and frozen blueberry exports	\$2,000,000 in increased exports	~\$400,000 in exports of frozen and dried blueberries
India	~\$30,000 in dried blueberry exports	\$200,000 in increased exports	~\$100,000 in dried and frozen blueberry exports
Korea	~\$3,000,000 in exports of frozen and dried blueberries	\$1,000,000 in increased exports	~\$6 million in exports of frozen and dried blueberries

Source: Export data all derived from USDA GATS

Aside from the figures above, no progress was made in fresh blueberry exports. Washington State is still prohibited from shipping fresh blueberries to China and Korea. Though fresh blueberries can be shipped to India, the logistics for such exports are a challenge and, to date, no exports have occurred.

### **BENEFICIARIES**

The Washington Blueberry Commission and its membership have benefitted from this project. Research findings were made available to the industry.

Trade leads were generated during each market visit. These were forwarded to industry members for actions and some of them remain open. The WBC is aware of trade leads with:

China (2) – one important fruit ingredient importer for processed blueberry ingredients, and one importer for frozen blueberries. The Washington Blueberry Commission is receiving approximately 5 sales leads a month from China.

India (2) – one fresh blueberry importer and one dried blueberry importer and wholesaler

Korea - The Washington Blueberry Commission is receiving five sales leads a month from South Korea for processed blueberry products.

### **LESSONS LEARNED**

The WBC considers this project to have been a success. An important contributing factor to that success was the direct engagement of industry members in the market outreach. Industry members traveled to each market and participated in meetings. This allowed for clear representation of Washington's blueberry industry and products and an honest assessment by exporters of each market's potential. Industry participation should be encouraged in all such research projects.

On the negative side, however, it could be argued that these research studies were potentially completed prematurely. China and Korea are not yet open to fresh blueberry shipments from Washington State and market visits to those two markets could have been stronger if participants were in a position to also represent fresh exports. Without knowing the timeline for a market access agreement importers could not commit to interest.

There were no unexpected outcomes or results.

Export goals that were set as expected measurable outcomes were not achieved however there are no real lessons learned that would apply to others. The original goals were largely dependent upon Washington State securing market access for fresh blueberries to China and Korea. That has not yet happened. Nevertheless, Washington continues to ship frozen and dried blueberries to all markets and those exports appear to be increasing. Moreover, the three projects helped raise awareness of the availability of Washington blueberries, which should help increase demand in the years ahead.

### **ADDITIONAL INFORMATION**

In 2014, 2015 and 2016 the Washington Blueberry Commission contributed to travel costs for three trade missions. The cost were \$6,070.69 for the trip to China, \$4,260.36 for the trip to India and \$5,291.70. Additionally, the Commission spent approximately \$2,000 on development of promotional materials and sample shipping costs.

Additionally, the WBC provided significant in-kind contribution to this effort in terms of donation of industry time for the travel time of the various members of the industry that went on the trade mission. It is hard to place a time value on, but three members for three trips for 8 days or 72 person days.

During the course of this SCBG the Washington Blueberry Commission decided to expand this effort with the contractor and provide additional funds to work to open up these three markets for additional exports in 2015 and 2016. For China and South Korea the focus is on allowing fresh blueberries to enter both markets and for India the focus is for tariff reductions. The fee for South Korea is \$10,000, China is \$10,000 and for India it is \$5,000 for each year so the combination of two years is an additional \$50,000 spent in the general area of expanding export markets in China, South Korea and India.

### **CONTACT INFORMATION**

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**Project Title:** A model for Incubating Beginning Growers & Teaching Sustainability Practices

**Partner Organization:** Viva Farms

## **PROJECT SUMMARY**

The average age of the Washington farmer is 57, and many farmers will retire in the next 20 years. Young people and Latino farm workers have great potential to carry the specialty crop industry into the future, but confront financial, educational, cultural, and language barriers.

Viva Farms, a bilingual agricultural business incubator in Skagit County, will increase the success of beginning and Latino specialty crop growers by providing in-depth assistance in every aspect of specialty crop production. The project will focus on providing training in organic production; tractor/equipment use, safety, and maintenance; accessing wholesale markets; food safety/Good Agricultural Practices (GAP) and business development. Viva Farms will incubate 25 new specialty crop producers and host workshops that will reach an additional 80 regional producers. Viva Farms will also work with WSU Small Farms Program to carry out a program assessment measuring the community, social, and economic impact of the incubator. The assessment will culminate in a published case study, and will be presented and distributed at industry outlets and conferences throughout Washington. The study will document a replicable incubator model and will inform the development of beginning and immigrant farmer training programs throughout the state.

Washington's specialty crop production faces a generational crisis: Per the 2007 agricultural census, the average age of farmers in Washington is 57, which is on par with the national average. In the next 20 years, 70% of all farmers are expected to retire. To replace retiring farmers and meet the market demand for local and organic specialty crops, Washington needs well-trained new producers, both operators and labor. Fortunately, there are two demographics that have the potential to carry agriculture, and specifically specialty crop production, into the next generation: young people and Latino farm workers.

However, beginning and Latino farmers face many challenges when trying to establish a new specialty crop operation, including gaining access to land, education, equipment, capital, and marketing channels. Latino farmers face additional language and cultural barriers. In Washington, only 4.1% of all farms are owned and operated by Latino farmers (USDA Agricultural Census, 2007), even though Latinos provide 83% of all US agricultural labor (US Department of Labor, National Agricultural Workers Survey, 2002). Furthermore, Latinos are extremely underrepresented in organic specialty crop production. Skagit County is the largest producer of specialty crops in western Washington, and organic production alone is valued at \$11,520,913, the highest value west of the Cascades (WSU, Current State of Organic Agriculture in Washington State, 2012). Yet out of Skagit's 44 WSDA certified organic farms, only two are Latino owned and operated, even though 17.3% of Skagit population is Latino, and most work in agriculture (US Census, 2010). While Latinos clearly have the agricultural experience and motivation needed to start specialty crop operations, the financial, cultural, and language barriers that stand in the way are often insurmountable. Given the foundational role that Latinos play in specialty crop production and the problem of impending farmer retirement, Washington needs more experiential and enterprise-based educational bridges to help Latino farm workers become highly skilled farm owners and farm managers.

Viva Farms was founded in 2009 to address the specific needs of new and Latino farmers, and to cultivate the next generation of Washington farmers. Viva Farms is Washington's most comprehensive bilingual farm business incubator, and addresses each of these barriers by leveraging high-quality technical assistance and providing access to land, education, equipment, capital, and markets.

The proposed project complements, but does not overlap with, the 2012 WSU Small Farms Team SCBG titled Increasing Latino Farmer Specialty Crops Sales through Intensive Direct Marketing and Cross Cultural Training. The 2012 project focuses specifically on direct marketing for existing Latino producers. This project uses a farm incubator model to help launch new farmers and train farm labor.

## **PROJECT APPROACH**

### **Project Administration:**

During the period of this grant, Viva Farms staff went through several staff changes, including Farm Manager, Produce and Sales Manager, Development and Communications Manager, and Executive Director. Two founding staff members left, including the Executive Director. Some of these changes resulted in delays in Project Administration, especially from late 2014 through early 2015.

In October 2015, an Amendment to the grant agreement was approved. This amendment covered three sections: *Period of Performance*, *Agreement Management*, and *The Project Plan*. The Period of Performance was extended to September 29, 2016. This extension allowed for completion of previously delayed or missed activities, including the hiring of the grad student and completion of the case study. The Agreement Management section was amended to list Executive Director Michael Frazier as the Viva Farms Agreement Manager. Finally, the Project Plan was amended to reflect new targets for some of the expected Measurable Outcomes; new dates of completion for certain activities; and extended the dates for all the activities related to the graduate student.

#### Work Plan Activities:

**Meet with subcontractors and partners to finalize work plan.** In January 2014, then Executive Director Ethan Schaffer reported that Viva Farms met with subcontractors and partners to finalize work plan. At that time, Viva Farms was expecting to work with WSU to find a graduate student to make a case study on the efficacy of Viva Farms. The partners began developing case study parameters by creating 2014 annual goals and metrics for measuring success. They identified strategies and measurable outcomes for each of the following goals, with the intention that the graduate student would evaluate them in the fall of 2014:

- Incubate successful farmers by increasing their profits and commitment to farming.
- Provide excellent education programs.
- Grow the farm stand into a financial supporter of Viva Farms as well as an outreach and educational tool for customers and Viva farmers.
- Increase fundraising efforts through effective grant writing and donor management.
- Develop long-term and strategic vision for Viva Farms.
- Assist farmers in achieving success post-Viva.
- Provide support for Latino and beginning farmers throughout Skagit Valley.

Despite discussing this plan early in the grant period, hiring a graduate student did not occur for the 2014 school year, in part due to injury of the ED over the holidays. In fact, recruiting a WSU grad student for the project did not occur at all during 2014, despite plans first for a spring 2014 start, then a spring 2015 start. In third quarter 2015, a contract amendment was negotiated with WSDA that included an extension of the period of performance to September 2016 to allow time for a graduate student to complete the study with a January 2016 start date. Kate Smith was recruited to complete the study. By that time, many priorities had shifted at Viva Farms, especially with respect to the farm stand. Efforts to turn the farm stand into a source of financial support for the farm had failed. In fact, the farm stand operated at considerable loss in 2014, due to both a large staff and waste of perishable inventory. Further, the farm stand was seen by many local farmers as a source of unfair competition. To ensure a large inventory, produce was being purchased from Charlie's Produce, the same company that supplies most of the local grocery stores in the area. It was selling conventional, non-local food far more than any local organic food grown at Viva Farms. It was also an outdoor farm stand lacking proper cold storage, which contributed to large quantities of waste. As a seven days per week, 10 hours per day operation, the farm stand required a large staff to operate it. For these reasons, the farm stand was scaled back considerably in 2015, only open 3 days per week, and only selling produce from Viva Farmers and a few other small local farms with whom Viva has a relationship. The marketing focus was shifted to wholesale markets.

#### **Co-facilitate Skagit's WSU Cultivating Success Ag Entrepreneurship course; provide additional business planning assistance to incubator applicants enrolled in the course.**

Viva Farms facilitated WSU's Cultivating Success class in winter of 2014. The course ran from Jan 9, 2014 to Mar 24, 2014. Student enrollment was 24, with an attendance average of 18 students. This class was also offered to students at Skagit Valley College (SVC) as part of the Sustainable Agriculture Education (SAGe) certificate. Four students enrolled in SAGe completed the course. Area farmers, business owners, and distributors were engaged to lead discussions and presentations.

Viva Farms facilitated the course a second time during the winter of 2015, from Jan 8, 2015 – Mar 26, 2015. Student enrollment was 28, with an attendance average of 19 students. Nine SVC SAGe students completed the class.

#### **Review applicants' business plans; self-assessment surveys, select producers; sign leases; assist with and submit applications for business licenses, farmer's markets, organic certification, WIC Farmers Market Program, and insurance coverage. Hold farmer orientation meeting.**

Twelve farm businesses signed leases in early 2014. Each farm business went through an orientation meeting that covered organic practices and standards, Viva Farms policies, and a review of crop selections.

1. Pure Nelida: Owned & operated by Nelida Martinez & Lizette Flores. Pure Nelida grows 72 Varieties of veggies and flowers.
2. Lozano Farms: Owned and operated by Santiago Lozano. Lozano Farms specializes in strawberries and raspberries.
3. Martina & Regino's Farm: Owned and operated by Martina Gutierrez. Martina and Regino's farm sells strawberries and green beans.
4. Funny Farm: Owned and operated by Britany Fink. Funny Farm grows beets, onions, carrots, and cauliflower.
5. Ali's Farm: Owned and operated by Dr. Ali Inad and Ghazi Adood. Ali's Farm sells a variety of vegetables and fava beans.
6. Ladyfield Farm: Owned and operated by Abbey Bloom-Esposito. Ladyfield grows ornamental plants for wholesale.
7. Buena Berry: Owned and operated by Mauricio Soto. Buena Berry grows blackberries, raspberries, and strawberries.
8. Sustenance: Owned and operated by Beth Meenaghan. Sustenance specializes in artichokes, winter squash, tomatoes, okra, chard, kale, and beans.
9. Arguta: Owned and operated by Anne Baxter. Arguta specializes in cold hardy kiwis.
10. Sabino's Farm: Owned and operated by Sabino Flores. Sabino's Farm grows chilacayote, chiles, beets, lettuce, and squash.
11. Lucy's Nursery: Owned and operated by Lucia Villegas. Lucy specializes in flowers and lilies.
12. Earthfire Farm: Owned and operated by Bruce Lindsay. Bruce grows lettuce, kale, onions, garlic and peas.

Outreach fellow Leigh Newman-Bell assisted four farmers to apply for WIC; five farmers apply for farmer's market vending. She also helped Pura Nelida get additional insurance to bring prepared foods to the farmer's market.

During the first two calendar quarters of 2015, fifteen farm businesses signed leases at Viva Farms. Each farm business went through an orientation meeting that covered organic practices and standards, Viva Farm policies, and a review of plant selections. 2015 farm businesses include:

1. Pure Nelida: Owned & operated by Nelida Martinez & Lizette Flores. Pure Nelida grows 72 Varieties of veggies and flowers.
2. Sustenance: Owned and operated by Beth & Kevin Meenaghan. Sustenance specializes in artichokes, winter squash, tomatoes, and cucumbers.
3. Sabino's Farm: Owned and operated by Sabino Flores. Sabino's Farm grows chilacayote, chiles, beets, lettuce, and squash.
4. Lucy's Nursery: Owned and operated by Lucia Villegas. Lucy specializes in flowers and lilies.
5. Matthew Cioni and Giana Walkim: Matt and Giana grow a variety of market vegetables, including mixed greens and peas.
6. Jason Crowell: Jason grows a variety of mixed market vegetables.
7. David Kim: A variety of mixed Asian herbs.
8. James Hanika: James grows a variety of mixed vegetables, including beans, peas, squash, corn and tomatoes.
9. Lozano Farms: Owned and operated by Santiago Lozano. Lozano Farms specializes in strawberries and raspberries.
10. Martina & Regino's Farm: Owned and operated by Martina Gutierrez. Martina and Regino's farm sells strawberries and green beans.
11. Buena Berry: Owned and operated by Mauricio Soto. Buena Berry grows blackberries, raspberries, and strawberries.
12. Earthfire Farm: Owned and operated by Bruce Lindsay. Bruce grows lettuce, kale, onions, garlic and peas.
13. Arguta Farm: Owned and operated by Anne Baxter. Arguta specializes in cold-hearty Kiwi's.
14. Boldly Grown Farm: Owned and operated by Jacob Slosberg and Amy Frye. Amy and Jacob grow cut flowers and winter storage crops. They operate a winter CSA.
15. Jonquil Farm: Owned and operated by Jonelle Schermerhorn. Jonelle grows squash and cucumbers.

James Hanika, who signed his lease early in 2015, decided not to farm at Viva after all due to his time commitment at a new job, bringing the total number of signed leases to 14.

During the first two calendar quarters of 2016, twelve farm businesses signed leases at Viva Farms. Each farm business went through an orientation meeting that covered organic practices and standards, Viva Farms policies, and a review of crop selections. 2016 farm businesses include:

1. Pure Nelida: Owned & operated by Nelida Martinez. Pure Nelida grows 72 Varieties of veggies and flowers.
2. Sustenance: Owned and operated by Beth & Kevin Meenaghan. Sustenance moved to a monocrop model, growing ½ acre of perennial artichokes and selling wholesale only.
3. Sabino's Farm: Owned and operated by Sabino Flores. Sabino's Farm grows chilacayote, chiles, beets, lettuce, and squash.
4. Matthew Cioni and Giana Walkim: Matt and Giana specialize in culinary herbs and some mixed market vegetables.
5. David Kim: A variety of mixed Asian herbs.
6. Lozano Farms: Owned and operated by Santiago Lozano. Lozano Farms specializes in strawberries and raspberries.
7. Martina & Regino's Farm: Owned and operated by Martina Gutierrez. Martina and Regino's farm sells strawberries and green beans.
8. Arado Farm: Owned and operated by Mauricio Soto. Formerly Buena Berry, Arado grows blackberries, raspberries, and strawberries.
9. Arguta Farm: Owned and operated by Anne Baxter. Arguta specializes in cold-hardy Kiwi's.
10. Boldly Grown Farm: Owned and operated by Jacob Slosberg and Amy Frye. Amy and Jacob grow cut flowers and winter storage crops. They operate a winter CSA.
11. Jonquil Farm: owned and operated by Jonelle Schermerhorn. Jonelle grows squash and cucumbers.
12. Cabrera Farms: Francisco Cabrera. Francisco Cabrera grows several varieties of lettuce.

**Review/finalize production plans; coordinate group purchases of spring supplies (propagation materials, tools, seeds, etc.); provide 1-on-1 field preparation support to new tractor operators.**

In spring of 2014, Viva Farms coordinated group buying for berry flats and pints, as well as produce boxes. Four farmers purchased 700 raspberry half pint flats, 2,400 pint flats, 9660 pints, and 40 waxed produce boxes. In early June, Viva Farms purchased a shipping container for storage to make better use of bulk purchasing and long-term dry storage.

In 2015, all the farmers had production meetings with new Produce and Sales Manager Erin Mercier regarding expected production, marketing and sales. Operations Manager Rob Smith coordinated the purchase of spring supplies, such as composted horse manure, wood chips, and organic fertilizer.

**Hold two 30-hour Tractor and Farm Safety courses at Viva Farms, once per grant year.**

Tractor safety courses were originally intended to be held during spring of 2014 and 2015. However, the 2014 class was cancelled due to low registration. Farm and Tractor Safety was held at WSU Skagit County extension during April – May 2015. This is the usual location for this course, although Viva Farmers are required to attend this course to use the tractors at Viva Farms, unless they can show they have prior experience driving tractors. Amendment 1 to the grant agreement amended this workplan activity to tractor safety courses being held in spring of 2015 and 2016.

WSU Skagit Extension director Don McMoran writes: “We had 22 participants this year in the 2016 WSU Skagit County Extension Gearing Up for Safety Course. There was a nice mix of youth, adults and Latino participants. All participants were able to pass the 70-question written test with a 70% or better, 80% on the pre-operational exam and 90% or better on the driving skills test over the 5 weeks and 20 hours of the course. This was one of the best groups we have ever had and I think it shows in the evaluations.”

**Ongoing: Daily, request-based assistance with pest, disease, weed, irrigation and field equipment management; organic compliance questions; marketing/sales and business management.**

These activities comprise most of the day-to-day work at Viva Farms. Here are some highlights from the 2nd quarter of 2014.

*Consultation with WSU entomologists:* In early spring, Viva Farmer Nelida Martinez noticed severe plant damage around the roots of her squash. She discovered Crane Fly Larva, something previously unseen at Viva Farms. Through the established partnership with the Washington State University Mount Vernon Research Center, the help of WSU entomologists Dr. Lynell Tanigoshi and Dr. Beverly S. Gerdeman was brought in, they were able to identify the

pest and help Nelida and other Viva Farmers develop an immediate solution as well as a remediation plan for next year. Nelida was already aware of one way to organically treat the pest using an organic approved product called Entrust. This product is incredibly expensive, but Nelida and other Viva Farmers were able to reduce the cost significantly by purchasing in bulk then divvying up amongst the farms. Additionally, farm manager Mauricio Soto provided expert guidance and training on using concentrated organic sprays to ensure that farmers used the product safely and effectively. Viva Farmers saw immediate results and were able to salvage their plantings. In the Skagit Valley, farmers have excellent resources at the Washington State.

*Washington State University Northwest Extension and Research Center.* However, research and extension services are not always accessible to beginning or Spanish speaking farmers. Viva Farms plays an essential role in the community by connecting and building relationships between the Latino farming community and WSU researchers and resources. The joint use of Entrust is a great example of how operating in close proximity at the incubator facilitates collaboration and allows multiple small farms to achieve economies of scale often unobtainable by new farms.

*Cover Cropping:* Vacant plots were planted with nearly four acres of buckwheat. This planting will help manage weeds and the long-term health of the farm. With the new organic certification it is essential to establish good soil building practices.

*Demonstration Garden:* New methods for planting systems were demonstrated to farmers. By setting up a half acre of beds mulched in plastic and planted in squash, farmers can understand the costs of using mulches versus manpower to maintain weeds. Viva is showing farmers how to find customers before planting, by preselling the squash planting to Pagliacci's, a pizza chain in Seattle.

*Organic Certification:* Finally, the most important achievement this quarter was becoming certified organic! The inspection was conducted on May 13, all farmers met with the inspector to go over their recordkeeping and farming operations. As a group, Viva will need to work on better record keeping for seed purchases and record keeping in general.

*Sales:* Viva Farms operates a retail farm stand and a wholesale program that sells to local restaurants, grocery stores, ice cream makers, and schools. The wholesale program has seen 23% growth in sales this year. There are several new clients and a frozen sherbet sold at Molly Moon's in Seattle made exclusively from Viva Farms Strawberries. These sales greatly increase the likelihood of success among the farmers.

Here are some highlights from the 3rd quarter of 2014.

*Cover Cropping:* Cover crop from 2nd quarter buckwheat planting was disked in, and have been worked in two additional times from dropped seed. Viva is currently with farmers to get fields cleaned and prepped for a winter rye planting.

*Organic Certification:* The certified transitional acres transitioned into organic this quarter.

*New and Growing Farmers:* Viva has signed a lease for one new farm business – The Crow's Farm. Matthew Cioni and Giana Wakim are growing on one acre with fall plantings like garlic and mixed vegetables for spring. They plan to sell to restaurants. Lucia Villegas, of Lucy's Nursery will expand her farm from .25 acre to .50 of an acre. Mauricio and Senaida Soto of Buena Berry, will expand from .60 acre to 2.6 at Viva Farms.

In 2015 – and in general – request-based assistance is a major part of the job at Viva Farms during the growing season. Both Operations Manager Rob Smith and Farm Manager Mauricio Soto are busy every day helping with equipment, offering advice about weed and pest management and irrigation. The Produce Manager works full time at marketing and sales.

**Ongoing: Monthly incubator farmer meetings covering topics such as organic production, food safety and post-harvest management.**

This activity was originally written as Bi-weekly, but amended to Monthly with Amendment 1 to reflect reality. Bi-weekly meetings are challenging with respect to both farmer time and staff time. Most of the incubator participants have jobs in addition to running their farm at Viva Farms. However, during the period covered by this grant, the monthly meetings have become more organized and useful, and have an agenda. During the growing season, there is

usually more to discuss than there is time for, including production and planning issues. Sales processes often take up much of the time, as the meetings are a good time to answer questions with as many farmers as possible present.

### **Quarterly individual meetings on production, marketing/sales and business administration progress and challenges.**

Quarterly meetings with individual farmers are informal and generally held on an as-needed basis. Some farmers engage frequently with Viva Farms staff, and may be in the office weekly. Other farmers are less present, and may interact only by phone or email. Factors affecting the amount of time staff interact with any particular farmer include the size of the farm business, type of crop grown, and whether the farmer also has another job, whether that job is full time or part time, and what kind of shift they work. Typically, the berry farmers with multiple acres in production are frequently interacting with staff about these issues during the berry season.

### **Quarterly individual records check in to assist with record keeping and compliance.**

These meetings began formally during the spring of 2014, when farmers met one-on-one with Operations Director, Shannon Carmody, to organize and prepare for the initial organic inspection. Each farmer also met one-on-one with the Oregon Tilth Organic Certified inspector to discuss their farming practices and business.

All the farmers met with the Operations Director again in September 2014 to discuss sales and record keeping as they relate to organic certification. Many of these meetings focused on creating systems to differentiate between conventional sales and organic sales.

In 2015, the organic certification for Viva Farms was renewed on April 1. The organic inspection was conducted on May 19th. Farmers were encouraged to bring their records up-to-date before that date. Organic certification and record keeping was discussed later in 2015 at the December 2 farmer's meeting.

### **Prepare quarterly progress reports for WSDA on project outcomes.**

Quarterly reports were submitted to WSDA throughout the period of performance.

### **Assist WSDA organic inspectors with interpretation as needed.**

Originally, Viva Farms expected to become certified organic under the WSDA. However, WSDA does not offer certification for incubator programs now, and Oregon Tilth has an established program. Oregon Tilth inspector John Hollinrake has worked with incubator farms and speaks basic Spanish. Viva Farms staff helped translate as needed, but encouraged the interaction and relationship building between Hollinrake and each farmer.

### **Hire WSU graduate student. Develop case study parameters and create study work plan. Finalize research methods and data collection timeline.**

This activity was delayed again and again throughout the grant period for reasons that were discussed earlier in the report. In January 2016, Kate Smith began the case study. As the Northwest Small and Latino Farm Educator with the WSU Extension Small Farms Program/Skagit County Extension, Kate was already very actively involved with Viva Farms. She serves as the translator at farmer meetings and many of the workshops, and works directly with many of the Latino farmers on paperwork or other areas where they need assistance and translation. Due to the nature of the surveys and interviews being conducted for the case study, this was ideal because there was already a level of trust between Kate and the Latino farmers.

For the period of Quarter 1 2016, Kate's tasks included:

- Conducting a literature review of current publications on Farm Incubators, Participatory Learning, Program Evaluation, etc.
- Refining research questions, project design and methods; accumulating data from past surveys; conducting interviews with previous participants to add to the data, using a revised version of the Viva End of Year Survey.
- Contacting NIFTI (National Incubator Farm Training Initiative). Kate intended to include some questions on her surveys from the upcoming national farm incubator survey.
- Applying through the WSU Internal Review Board to get the evaluation approved as an ethical approach to research. Kate found that an evaluation would be counted as exempt from going through the elongated process.

For her dissertation, Kate plans to write about the Contributions of Farm Incubators to Sustainable Food Systems.

For the 2nd quarter of 2016, WSU graduate student Kate Smith reported:

- Data Collection is currently underway with interviews with current and past Viva Farms participants
- Data analysis platform has been chosen and data entry has begun
- Draft of case study has been started
- She applied to present at the Tilth conference leading a panel session on Farm Incubators (after approved she will reach out to have someone from Viva participate on the panel)

Kate completed her work study plan during this timeframe. It is included as an attachment.

### **Coordinate, aggregate and transport bi-weekly product deliveries to retailers, restaurants and institutions in North Puget Sound.**

In 2014, Viva Farms completed the wholesale program on October 1. Sales increased nearly 15%, from \$39,791 in 2013, to \$46,468 in 2014. Viva Farms sold more produce through the Puget Sound Food Hub, adding two more delivery days to the wholesale delivery schedule. The wholesale program added several new customers in Bellingham and Seattle, including Molly Moon's ice cream, which accounted for 10% of 2014's wholesale sales and provided wonderful promotional opportunities.

Increased sales also brought more challenges. Viva Farms exceeded the capacity of the delivery van, which is a standard size passenger van with the seats removed. The farm partnered with Community Action to rent a larger delivery van when delivering more products. Organic certification provided access to new customers in higher-end markets. One lesson learned was that farmers needed training in grading and packing to be prepared for these new markets.

In 2015, the Produce Manager brokered sales and deliveries for farmers through three different wholesale markets: The Puget Sound Food Hub, Viva Farms wholesale, and the Viva Farms farm stand. Viva Farms purchased \$12,443 worth of produce from incubator participants for sales through the Puget Sound Food Hub. The Food Hub provides web-based centralized purchasing, invoicing, and distribution for farmers and buyers throughout the Puget Sound region. Deliveries from Viva were made twice per week to the Food Hub distribution center at Bow Hill Blueberries.

Viva Farms also runs a wholesale program directly to several locations in Seattle, including Molly Moon's Ice Cream and Stockbox Grocery. Produce was delivered to Seattle customers every Tuesday and Friday.

Viva Farms changed the business model of the farm stand somewhat in 2015, committing to selling only produce from Viva farmers and a few other local farms. For this reason, the ability to stock the farm stand fully was limited compared to other years, and so the hours of operation were reduced. The farm stand was open Thursday, Friday, and Saturday from 11 am to 7 pm. An unseasonal storm with high winds damaged the farm stand in August, abruptly ending the strawberry season and causing the farm stand to be closed for one weekend in August. Viva Farms purchased \$14,643 worth of produce from Viva farmers for sale at the farm stand. That amount breaks down to \$6,803 for July, \$5,668 for August, and \$2,172 for September.

Due to the unusually warm and dry summer in 2015, wholesale produce sales continued into October, and sales on the Puget Sound Food Hub continued into November. At the end of 2015, sales had increased nearly 41% over 2014 – from \$46,468 to \$70,473.

2016 was not actually a reporting period for this activity, but at this writing, 2016 sales are at \$127,464, an 81% increase over 2015.

### **Quarterly meetings on case study data collection.**

The first meeting was held on April 29th. WSU graduate student Kate Smith presented her research to date. After this meeting, her project plan was approved by her advisors at WSU.

**Annual review (generate and/or review each farmer's Profit/Loss report, revise business plan for next season, discuss spin-off readiness); pre-CPA tax preparation.**

During Oct-Dec 2013, Viva Farms staff met with all 12 farm businesses to evaluate their farms and businesses for 2013. The total acreage in production by Viva Farmers was 47.675 (up from 44 in 2012). This includes land both on and off-site – Viva Farms itself was not fully leased. Most farmers saw increases in their profits. However, Viva's most successful farm, Lozano Farms, saw little increase due to pest problems. This sparked discussion of better farm-wide pest, weed, and disease management. The staff planned to implement an Organic Systems Plan (OSP) for 2014, to outline preventive measures, expectations of Viva incubator participants, and record keeping requirements. The OSP will allow Viva Farms and all incubator participants to become organically certified, increase profit, and find new markets.

Operations Director Shannon Carmody met with each farmer in September of 2014 to discuss sales and recordkeeping, and to evaluate farm businesses for 2014. Two farm businesses left Viva at the end of 2014. This includes Ali's Farm, owned and operated by Dr. Ali Inad and Ghazi Adood. Ali and Ghazi found they lived too far away from Viva to be present at the farm often enough to care for their crops. Brittany and Craig Fink-Minklin, who owned and operated Funny Farm, also left at the end of 2014 due to a move to Wenatchee, WA.

End-of-season annual reviews were conducted with 13 of 14 farm businesses at the end of 2015. Of the 14, two left and 12 remained for the 2016. The farms that left included Earthfire Farm, owned by Bruce Lindsay. A retired USDA soils scientist, Bruce found that working ½ acre on his own was too much work. He had a change of heart early in 2016, but Viva was fully leased by then. However, another farmer who was not using all her land allowed Bruce to use a portion. Bruce also volunteered his time at Viva in many areas, especially helping with the land-based practicum, which was in its first year in 2016. As a volunteer, he is a valued asset to the Viva team. He will again be leasing ¼ acre in 2017. The other farmer who left at the end of 2015 was Jason Crowell. Jason's experience at Viva Farms convinced him that farming was not what he wants to do. In some ways, this counts as a success for an incubator farm - it allowed Jason to give farming a try for a season without too much financial commitment, and helped him make a lifestyle choice.

Fifteen farmers began farming at Viva Farms in 2015. Lucy's Nursery, a cut-flower business, left much earlier in the season after she could acquire land off-site.

### **Final Data Collection Meeting**

In 2016 the final data collection meeting for the case study by WSU graduate student Kate Smith was held September 23rd at Viva Farms. The discussion included:

- Update on data collection progress
- Ask for support following up with a few past participants that Kate had not been able to reach
- Scheduling of 2 staff interviews
- Create a calendar for drafts, edits, proofs and final draft of case study
- Plan for presentation at Tilth Conference
- Brainstorm case study distribution plan

During the meeting, Kate and the staff decided that Executive Director Michael Frazier would be the Viva representative on the panel discussion at Kate's presentation at the Tilth Conference in November in Wenatchee, WA.

### **Analyze data and draft case study report**

**Edit, proof, fact check final draft of case study. Publish case study.**

WSU graduate student Kate Smith compiled the results of her case study into a Preliminary Report, which is attached. Kate also produced a one page infographic to illustrate the results of the study. This document is also attached.

**Distribute case study to agriculture organizations, publish online (Viva Farms, WSU SFT and other websites) and present at conferences. Amendment 1 noted: Report will be presented at appropriate conference that may fall outside of grant timeline.**

WSU graduate student Kate Smith presented her report at the Tilth Conference in Wenatchee, WA on November 13th. This is the program description of her presentation:

*Tilth Conference 2016*

*Session D, Sunday November 13th 9am-10:15am*

*Farm Incubator Training Programs: Contributions to Sustainable Food Systems*

*Farm incubators have surfaced as one method for training the next generation of farmers. How are these programs designed and are they working? What kinds of contributions are farm incubators having toward our sustainable food systems? How do we measure the impacts of these programs environmentally, socially and economically? Hear from incubator organizers from around Washington State in a panel discussion followed by a presentation on incubator evaluation with a preliminary Impact Evaluation Report of Viva Farms, presented by WSU Graduate student Kate Smith. Attendees can expect to learn more about farm incubator programs around Washington as well as ideas for program impact evaluation.*

Kate gave her presentation, followed by a panel discussion. The members of the panel included Michael Frazier of Viva Farms, Matthew McDermott of Cloud Mountain Farm, and Kyong Soh of Tilth Alliance Farmworks. The presentation was well attended and generated good discussion and questions from conference attendees.

Pictures from the conference, the info-graphic, and a copy of the preliminary report are available at [www.VivaFarms.org](http://www.VivaFarms.org).

Don McMoran, Director of WSU Skagit County Extension, coordinated and facilitated the tractor and equipment operation and safety classes in 2015 and 2016.

Dr. Marcia Ostrom, PhD, Director of the WSU Small Farms Program, was responsible for selecting and advising the WSU graduate research student, Kate Smith, and overseeing the Viva Farms case study in consultation with the Viva Farms team.

The period of performance for this grant covered a transitional period for Viva Farms. Co-founder and Executive Director Ethan Schaffer left late in 2014, with Michael Frazier taking the role of interim Executive Director. Presented with an opportunity to pursue graduate studies at WSU, Operations Director Shannon Carmody left in January 2015. Production Manager Rob Smith moved into the role of Operations and Incubator Director, and Michael Frazier became Executive Director. Two new staff members joined the team in 2015: Produce and Sales Manager Erin Mercier and Development and Communications Manager Beth Meenaghan. It was necessary to hire a new Produce and Sales Manager in March 2016, when J.R. Staton joined the team. Despite these transitions, everyone has worked hard to stay on track with the project's goals, and the WSDA has worked closely with Viva Farms to amend the contract as appropriate. The support of the WSDA and project partners WSU Skagit County Extension and WSU Small Farms team was significant and greatly appreciated throughout this time.

The scope of this project only benefitted specialty crops.

## **GOALS AND OUTCOMES ACHIEVED**

### **Outcome 1:**

Goal: Establish new specialty crop producers in Skagit County with an emphasis on socially disadvantaged producers.

Viva Farms added only one new producer in 2016 because the farm was fully leased with continuing producers, due to existing farm businesses requesting more land and land resource limitations at the current site. Six of twelve producers in 2016 were Latino. However, Latino farmers were responsible for over 50% of the acreage leased at Viva Farms, as well as for over 50% of sales.

Of the farm businesses who finished the 2016 season at Viva Farms, 7 have been operating at Viva Farms since at least 2013; five of these are Latino owned. Lozano Farms, owned by Santiago Lozano, is "launching" at the end of 2016, and will be operating his farm business on land leased elsewhere in Skagit County.

### **Outcome 2:**

Goal: Beginning Latino and specialty crop producers increase knowledge of organic production systems; farm equipment operation, safety, and maintenance; Good Agricultural practices (GAP); wholesale marketing; and business management.

- Viva Farms met the target to provide daily one-on-one technical assistance and training to 25 incubator participants over the first, second, and third years of the grant period.

- In each year of the grant period, Viva Farms assisted farmers with taxes, obtaining business licenses, and carrying insurance on an as needed basis. In the end-of-year evaluations, Viva Farms included survey questions to create a complete picture of all producers to see if they are maintaining a business license, filing Schedule F, and carrying insurance. This data was collected for 2015, but is on written documents and has not been collated. The surveys have not been carried out yet for 2016.
- All incubator participants had access to land, equipment and infrastructure. In 2014, storage was identified as a new piece of infrastructure needed at Viva Farms to provide farmers with space to dry, store, and cure produce. In 2015, a large barn convenient to the property was available for drying garlic and storing winter squash.
- Viva Farms routinely purchases many items in bulk to save money for every farmer, including items such as boxes for produce and berries, cover crop seeds, and fertilizer.
- End-of-course surveys are completed whenever a workshop is held. Through 2016, 96% of participants report increased knowledge.
- Farm and Tractor Safety Course was held at WSU Skagit County Extension during April-May 2015 and April-May 2016.

### **Outcome 3:**

Goal: Increased number of Latino-owned certified organic specialty crop farms in Skagit County.

Viva Farms achieved the goal of 6 Latino-owned certified organic specialty crop farms operated at Viva Farms in 2014, 2015 and 2016.

### **Outcome 4:**

Goal: Increased knowledge amongst producers, support groups and government agencies of best practices for developing specialty crop farm incubator programs for beginning and socially disadvantaged producers.

WSU graduate student Kate Smith has completed a Viva Farms Case Study, and has published her preliminary report titled *Farm Incubator Program Impact Evaluation*. Her findings were recently presented at the Tilth Conference in Wenatchee, WA on November 13, 2016, followed by a panel discussion with representatives of three incubator programs, including Viva Farms. Kate also produced a one-page infographic to summarize the survey data. The report and the infographic are attached to this report.

Outcome 4: Kate Smith's study will not be complete for several more months. At this time, Viva will not be able to meet the requirements of distributing to all non-profit organizations and government agencies serving beginning and socially disadvantaged producers in WA. The case study will need to be presented at one more agricultural conference, and at least one media outlet will cover the case study findings. The current preliminary report has already been made available on the Viva Farms website, and will soon be available on the WSU Farm and Food System Program Webpage.

Viva Farms and WSU completed all the activities and goals for the project, with a few exceptions that were addressed by Amendment 1 to the contract. The primary goal that had to be adjusted was the number of participants. Viva Farms reached a ceiling on available space before the project could reach the number of participants anticipated. When the project began in 2013, there was no time-limit established for farmers to remain at Viva Farm, and little incentive for the farmers to move their business off-site. This meant the rate of new producers replacing departing producers was not as high as initially anticipated.

The WSU Tractor and Farm Safety course also did not draw as many participants as initially anticipated.

### **Outcome 1:**

The goal for Outcome 1 was "establish new specialty crop producers in Skagit County with an emphasis on socially disadvantaged producers." As written in the original proposal, the target was "25 individual producers *per grant year* incubated at Viva Farms, *10 new and 15 continuing*. The increase in participation will bring the incubator to full capacity with approximately 5 new producers replacing graduating producers each year. At least 50% will meet the USDA definition of a socially disadvantaged producer."

By 2015, it was clear we could not meet these numbers. There are four factors that impact how many producers we are incubating during any grant year: 1 – interest from new potential participants; 2 – how much land each farmer is leasing; 3- how much land we have available; 4 – whether existing participants are "graduating" or moving on for other reasons.

When Amendment 1 to the contract was written in 2015, the target for Outcome 1 was changed to read: "*15 individual producers per grant year incubated at Viva Farms, 5 new and 10 continuing*." There were 15 farm businesses operating at Viva Farms in 2015.

Between existing farmers increasing acreage, and some experienced new farmers starting with relatively high acreage, Viva Farms was fully leased in 2016 with only 12 incubating farms participating – and the farm had to turn away interested individuals. In many cases, the incubator farms are operated by more than one individual – usually two family members, but in some cases, business partners. In that way, Viva Farms has met the metric of “15 individual producers.” Fifty percent of the 2016 farm businesses meet the USDA definition of socially disadvantaged.

#### Outcome 2:

The goals and targets of this outcome were broad and varied. Goals include:

- Beginning and Latino specialty crop producers increase knowledge of organic production systems
- Farm equipment operation, safety, and maintenance
- Good Agricultural Practices (GAP)
- Wholesale marketing
- Business management

The targets are listed below. Progress towards those targets is indicated in **bold**. Unfortunately, Viva Farms does not have baseline data from 2013 for this data, and 2016 surveys have not yet been conducted. The information below reflects data from 2014 and 2015.

- Deliver daily one-on-one technical assistance and training to 25 incubator participants over the 2-year grant period. **Amendment 1 extended the project through the 2016 growing season, so Viva Farms is counting three years for the project.**
  - All 25 will gain access to land, equipment and infrastructure
  - **Viva Farms has met this goal. There has been a total of 26 independent farm businesses operating at Viva Farms in the time frame spanning from 2013, the baseline year. Additionally, many of the businesses have two or more active participants in the program.**
- Obtain WA state business licenses. **In 2014, 12 farmers completed end-of-year surveys. Of these, 10 reported having a WA state business license. In 2015, out of 13 surveyed farmers, 9 reported having business licenses. One farmer had one formerly but had not renewed.**
- Report farming income on IRS Schedule F. **In 2014, 3 farmers reported filing Schedule F. In 2015, 7 farmers reported they planned to file Schedule F for the 2015 tax year.**
- Carry comprehensive liability and product insurance (group and/or individual). **In 2014, 2 farm businesses reported carrying liability and product insurance. The number remained the same for 2015.**
- Reduce input and marketing supply expenditures by 15% through group purchase. **Viva Farms has established regular group purchasing of both marketing supplies and field inputs such as fertilizer, manure, and seeds. Most farmers are taking advantage of the group purchasing, and buying their supplies from Viva Farms. This is especially true of the smaller businesses. However, the recordkeeping from the farmers is insufficient to determine how much they have reduced their expenditures for these items.**
- Collectively, farmers will sell more than \$200,000 in produce. **The incubator participants at Viva Farms reached this metric in 2015. Viva Farms is getting close to exceeding this value in a single year, and is on target to reach it in 2017.**
- All 25 will report increased knowledge and application of topics covered in a self-assessment. **Farmers report increasing knowledge in most areas – unless they considered themselves fully knowledgeable already. Both Viva Farms and the farmers continue to identify new areas where they need to improve knowledge.**
- 80 (later amended to 50) beginning specialty crop producers attend a 30-hour Tractor and Farm safety course and receive a passing grade. **20 participants attended tractor safety in 2015. 22 participants attended tractor safety in 2016.**

#### Outcome 3:

The goal was to increase the number of Latino-owned certified organic farms in Skagit County. The baseline was 2 Latino-owned certified organic farms operating in Skagit County in 2013. The target was to increase that number to 6.

There are currently 6 Latino-owned farms at Viva Farms that have organic certification under Viva Farms “umbrella.” This means that Viva Farms holds the certification. All of the farm businesses at Viva Farms are farmed organically, and do all of the necessary recordkeeping, which is all part of the organic certification

process for Viva Farms. Two of the non-Latino owned businesses have obtained their independent organic certification. Viva Farms expects four more farms to obtain independent organic certification in 2017, and further expects one or two of those to be Latino-owned.

#### Outcome 4:

The goal and target for outcome four are related to the research project conducted by WSU graduate student Kate Smith. Ms. Smith accessed the program impact of the incubator program at Viva Farms, including the economic impact and effective practices. Because her research was conducted later in the project than initially intended, she has not quite met all targets. However, her preliminary report has been distributed and the findings are attached to this report. Ms. Smith presented her preliminary findings at the Tilth Producers Conference in Wenatchee, WA on November 13, 2016. To meet the requirements of her graduate program, her project is still ongoing.

### **BENEFICIARIES**

Socially disadvantaged and beginning farmers and ranchers have benefitted from this project.

The following information is from Kate Smith's "Viva Farms Case Study" report, beginning on page 4. The full report is attached.

#### *Age*

Participants reported mean (average) age of 42 years old. 25.9% of participants were 35 years of age or younger while 74.1% 35 to 64 years of age, and no participants were older than 65 years of age. The average age for all primary farm operators nationally is 58.3 years old (USDA Ag Census, 2012).

<b>AGE</b>	<b>VIVA FARMS PARTICIPANTS % (2015)</b>	<b>BEGINNING FARMERS NATIONALLY 1 TO 5 YEARS ON CURRENT FARM (2012)</b>
Less than 35 years	25.9%	14%
35 to 64 years	74.1%	70%
65 years +	0%	16%

#### *Gender*

Participant respondents at Viva Farms were 40.7% female farmers, while the nationally women represent only 18% of farmers (Ag Census 2012 Highlights, 2014). Generally, Incubator farms nationally support higher numbers of female farmers than the national percentage, with an average of 48% female farmer participants reported in 2015 (*National Incubator Farm Training Initiative*, 2015).

<b>GENDER</b>	<b>VIVA FARMS PARTICIPANTS (2015)</b>	<b>BEGINNING FARMERS NATIONALLY 1 TO 5 YEARS ON CURRENT FARM (2012)</b>	<b>INCUBATOR FARMS NATIONALLY (2015)</b>
Male	59.3%	82%	52%
Female	40.7%	18%	48%

#### *Race/Ethnicity*

<b>Race/Ethnicity (n=27)</b>	<b>Viva Farms participants % (2015)</b>	<b>Beginning Farmers Nationally 1 to 5 years on current farm (2012)</b>
White	48.1%	90%
Minority	51.9%	10%
Latino	22.2%	
Indigenous Latino	22.2%	
Asian American	3.7%	
Other	3.7%	

### *Education level*

Viva Farm participants have a range of educational backgrounds from less than third grade education to university master degrees. Field programming has been shown as an effective educational strategy accessible to all, even those with limited or low levels of education (Davis et al., 2012).

<b>EDUCATION LEVEL (N=26)</b>	<b>VIVA FARMS PARTICIPANTS</b>
Less than High School	46.2%
Some College/Associates Degree	7.7%
College Graduate	30.8%
Graduate Degree	15.4%
PhD	0%

### *Previous farming experience before Viva Farms*

As a program open to all aspiring farmers, participants of Viva Farms have a wide variety of experiences in agriculture previously ranging from no experience to those that have been farming all their lives. Experience ranged from no experience to 45 years (since childhood) with an average of 10 years of experience farming. As several participants worked as farmworkers before transitioning to farm owners, the level of field experience contributed to a high average.

<b>EXPERIENCE FARMING (N=22)</b>	<b>YEARS</b>
Average	10
Median	6
Minimum	0
Maximum	45

### *Goals for Farming*

Participants enter the program with different initial goals for agriculture. Eleven (52.4%) of participants indicated that their goal when they started at their farm business was to eventually have farming be their primary source of income. Eight (38.1%) of participants identified their farming goal to have it be a secondary source of income while only two (9.5%) cited their goal for farming as quality of life. Many farmers commented that quality of life was part of their farm goals. No participants indicated that they started the program without the goal of owning their own farm but only to get a job in agriculture, although several participants since participating have worked in agriculture (see Table 5).

<b>GOALS FOR FARMING</b>	<b>N=21</b>	<b>PERCENT</b>
Primary Source of Income	11	52.4
Secondary Source of Income	8	38.1
Quality of Life	2	9.5
Job in Agriculture	0	0

### *Work on the Farm*

31% of those farming in 2015 reported Full Time Seasonal work (more than 35hrs per week per operator) while 69% reported Part-Time work on their farm with work off the farm. Nationally, 77% of beginning farmers on current farm for 1 to 5 years worked off the farm (Ag Census 2012 Highlights, 2014)

Data was reported by program participants and/or collected by Viva Farms staff over the period of the project. Unfortunately, due to many personnel changes, especially during late 2013 and through January 2015 time frame, data collection was inconsistent, and there was loss of continuity in information. For example, solid baseline data for 2013 is incomplete either because it never existed, or no one knows where it is.

However, a consistent end-of-year survey process was established in 2014 and has been carried forward since that time. Survey questions have been adjusted as needed. For example, if the questions were not providing the information needed or intended, or participants were reluctant to answer them, the surveys may be adjusted from year-to-year.

Kate Smith describes her evaluation methods for the Case Study on page 3 of her report as follows:

“We used qualitative and quantitative methods to conduct the impact evaluation for this research project. This evaluation was conducted through interviews and surveys with current and past participants, participant observation as well as Viva Farms staff interviews. We analyzed responses and data from end of season interviews with 12 current participants and 10 interviews with past Viva Farms participants. The selection of our interview participants included all current and past participants.

Interview and survey questions were designed after Agriculture and Land-Based Training Association's End of Year Interviews and a study of University of Santa Cruz Apprenticeship in Ecological Horticulture conducted by Perez et al. in 2010 (Martin, Bernau, Lindsay, Perez, & Landeck, n.d.)

We analyzed responses and data from 2015 End of Year Surveys conducted in November and December 2015 with 14 2015 Viva Farms Participants as well as conduct interviews with 8 previous participants and 13 follow up interviews with current participants during spring and summer 2016. The case study also included unstructured interviews with Viva Farms Staff members and general participant observation. Ongoing participant observation included shadowing farmers during operations, attending professional development meetings and Monthly Viva Farmer meetings, all of which helped develop themes for analysis. This also allowed development of trust with participants to fill out farmer narratives. Data gathered from surveys and interviews was analyzed to create an impact analysis. Results were additionally compared and supported with data from National Incubator Farm Training Initiative annual survey results, USDA Agriculture Census data and Small Farm Viability research data.

Viva Farm staff contacted past Viva Farms participants via phone and email in May 2016 to share the purpose of the study and invite to participate in the study with a scheduled interview at their farm. In June 2016, we sent follow up emails and phone calls. Additional follow up included phone calls, messages, email invitations, and contact again from Viva Farms and from previous leadership. The interviews consisted of a visit and a structured interview that was audio-recorded with participant consent. We conducted structured interviews in person and over the phone when necessary. Interviews were recorded. Interviews ranged from 20min to 60 minutes. Interviews were conducted in Spanish (9) and English (13). I collected secondary data through survey results and Viva Farms materials. (Goldberger, 2008)."

### **LESSONS LEARNED**

The staff at Viva Farms and WSU have not yet had the opportunity to discuss, as a group, the lessons learned from the WSDA SCBG grant. Since this project has run for three years, there are certainly lessons learned, some that have come up along the way and changes have been implemented. But there has not been a formal compilation of the lessons learned. Some of the biggest lessons learned have come to light while putting this final report together. These thoughts will be compiled and communicated to the staff, in order to develop improved processes moving forward.

No unexpected outcomes or results affected the project.

### **ADDITIONAL INFORMATION**

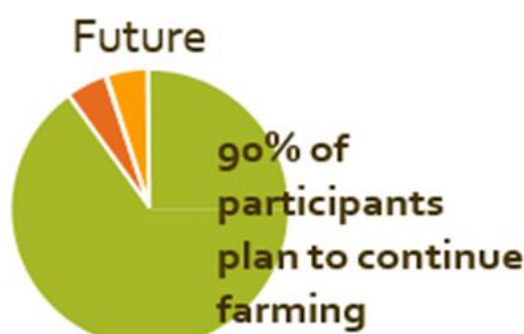
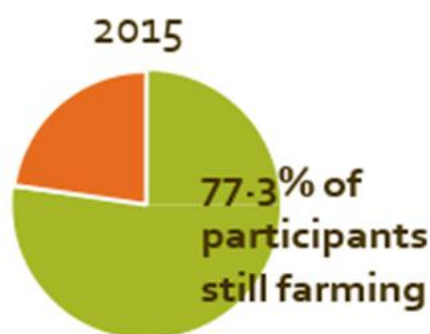
<b>Total In-kind match for Year 1:</b>	<b>\$37,492.00</b>
Farm manager and produce manager at .25 FTE for one year:	\$17,600.00
15% administrative overhead for one year	\$6,392.00
use of Viva Farms land and facilities for one year	\$8,000.00
Tractor and equipment use for one year	\$2,500.00
WSU small farms team administrative overhead for one year	\$3,000.00
<b>Total In-kind match for Year 2:</b>	<b>\$37,492.00</b>
Farm manager and produce manager at .25 FTE for one year:	\$17,600.00
15% administrative overhead for one year	\$6,392.00
use of Viva Farms land and facilities for one year	\$8,000.00
Tractor and equipment use for one year	\$2,500.00
WSU small farms team administrative overhead for one year	\$3,000.00
<b>Total In-kind match for Year 3:</b>	<b>\$37,492.00</b>
Farm manager and produce manager at .25 FTE for one year:	\$17,600.00
15% administrative overhead for one year	\$6,392.00
use of Viva Farms land and facilities for one year	\$8,000.00
Tractor and equipment use for one year	\$2,500.00
WSU small farms team administrative overhead for one year	\$3,000.00

Total In-kind match over three years: \$112,476.00

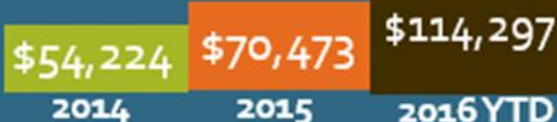
# Viva Farms Incubator Impact Evaluation Preliminary Report

Prepared by Kate Smith, Washington State University

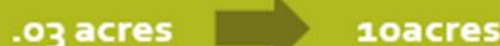
## 28 Farm Businesses incubated since 2010



## Farmer Produce sold through Viva Farms



## 2015 Average Farm Size 1.56 acres



## Participants farming in 2015 reported

**95%**

Have increased access to healthy food for those with limited access

**82%**

Maintain Organic Certification

**76%**

Plant cover crops and pollinator habitat on their farms

**100%**

Use water conservation practices including drip tape irrigation and mulch

**68%**

Work in Agriculture or Food outside of running a farm business

## Participant Demographics



52.4% Plan to farm as a primary income

This project was funded by the Washington State Department of Agriculture Specialty Crop Block Grant. Data was collected through farmer surveys and interviews with participants representing 22 of 28 farm businesses that have farmed at Viva Farms

## AVERAGE AGE

Viva: 40.2 years  
Nationally: 58.3 years



## RACE/ETHNICITY



Washington  
State Department of  
Agriculture



**VIVA FARMS**

WASHINGTON STATE  
UNIVERSITY

# WSDA SPECIALTY CROP BLOCK GRANT

## VIVA FARMS INCUBATOR CASE STUDY

Kate Selting Smith

### Study Work Plan

In this project I will conduct a Case Study of Viva Farms as an incubator farm evaluating the social, economic and environmental impacts of the program. This will include a description of program operations and an in depth analysis of data collected from end of year interviews and surveys from current farmers, past participants and incubator staff.

### Research Methods

We will use qualitative and quantitative methods in this research project. The selection of the study participants will include all current and past participants of Viva Farms. We will analyze responses and data from 2015 End of Year Surveys conducted in November and December 2015 with 13 current Viva Farms Participants as well as conduct interviews with 15 previous participants in May 2016. The case study will also include digital storytelling with current farm incubator participants in May 2016, interviews with Viva Farms Staff members, and general participant observation.

Data gathered from surveys and interviews will be analyzed to create an impact analysis. Results will be compared and supported with data from National Incubator farm Training Initiative annual survey results, USDA Agriculture Census data and Small Farm Viability research data.

### Data Collection Timeline

#### Phase 1- January-March

Literature review of Incubator project evaluations Determine parameters of evaluation project

#### Phase 2- April-June

Data collection from 2015 End of Season Interviews Farmer Interviews- Previous Viva Farmers

-Digital Storytelling interviews with current farmers

-Follow up surveys with current Viva Farmers

#### Phase 3- July-August

Compile results from farmer interviews and surveys Analyze results

Apply to present at regional conferences

#### Phase 4- August- September

Design info graphics to display impact results for 2015 season impact Write Impact Evaluation Initial Findings

Submit Initial findings to WSDA under Specialty Crop Block Grant

### Case Study Parameters

#### **Viva Farms Training impact**

- # of Viva Participants (current and past) farming in 2015/2016 (On/Off site)
- # of Viva Participants (current and past) working in Food System jobs
- Number of trainings provided per year by topic
- Number of total attendees and participants in trainings throughout 2015
- Total Farmer produce purchased and sold
- Number of markets reached
- Average years of Farming experience/average years at incubator

**Economic indicators:** Training new farmers

- Farmer Profitability
  - Value of Assets
    - Sales and Expenses (Average)
    - Expense to Sales Ratio
    - Percent of operators with net gain
- Jobs created/maintained
- Worked off the farm/Primary Occupation
- Sales range categorized for part-time, full-time etc.
- # Farmers accessing grants and loans

#### **Social Indicators:** Improving access to food and farming

- Contributions to Community Food Security
  - Quantity of food donated (Viva totals)
  - Quantity of food sold to food banks, daycares, schools (Viva Totals)
  - Contribution to family food security for participants
- Leadership roles taken in the community
- Increased access to farming
  - Racial and ethnic diversity of participants
  - Gender of participants
  - Age of participants
- Farmer Support Network
  - Membership in Farmer Organizations
  - Farmer Mentor

#### **Environmental Indicators:** Producing food in an ecologically sustainable manner

- Contribution to organic production
    - Number of Certified Organic Farms
  - Implementation of sustainable production methods
    - Water conservation practices
    - Cover cropping
    - Soil testing and nutrient management
    - Utilization of practices that promote soil quality and health
    - Physical, cultural, and biological controls for pest and disease management
    - Planting of pollinator habitat
    - Improved nutrient cycling
    - Crop Rotation plan
    - Improved energy efficiency/green energy sources
    - Use of approved organic inputs
    - Non-use of synthetic or petrochemicals
    - Other environmental sustainability practices
- 
- Focus on environmental topics in training (Viva training topics)
  - Development of an environmental ethic- anecdotal
  - Self-evaluation of knowledge

## **Data collection Tools**

### **End of Year Surveys with 2015 Viva Farms Incubator participants:**

End of Year survey interviews were conducted in December and November of 2015 with 2015 Viva Farms participants by Viva Farms staff. Surveys questions were created in collaboration with Viva Farm Staff and Kate Smith and were modeled after questions in from ALBA Farm Incubator End of Season Survey and the UCSC CASFS 2010 Alumni survey. Data will be compiled without participant names or business names and will be analyzed for economic, social and environmental impact indicators. See Appendix A for survey. Follow up interviews will be conducted with current farm participants in June 2016.

### **Past Viva Farms participant surveys:**

In May and June 2016 we will conduct interviews with previous Viva Farms participants in reference to the 2015 growing season. Responses and data will be recorded on paper and with participant approval, through voice recording. Data will be compiled without names and analyzed for economic, social and environmental impact indicators. See Appendix B for survey.

**Digital storytelling interview questions:**

May 9th-13th, 2016 digital storytelling interviews will be conducted with incubator participants by Kate Smith in collaboration with WSU English Department Professor and six WSU English department students. Interviews will be conducted with three primary farm participants and additional participants secondarily. Video interviews may be included in the final case study report with participant approval.

- Tell us about your farm business.
- Why do you farm at Viva/why did you start farming at Viva Farms?
- What do you like most about farming at Viva?
- Why do you farm organically?
- Has the programming at Viva Farms helpful or useful?
- Has Viva changed the amount of risk you've had to take in opening your business?
- Has running your own farm improved the quality of food you and your family eat at home?
- Has participating at Viva Farms changed the way you farm?
- What does your farm look like 5 years from now?

**Incubator Staff interview questions:**

Incubator staff interviews will be conducted in May and June 2016 with 2 staff members to gather supporting data for the evaluation case study.

- How many participants farmed at Viva in 2015? In 2016?
- How did land use change at Viva Farms from 2015-2016?
- How many trainings were facilitated in 2015? What were the focus topics?
- How many total attendees participated in Viva Farms trainings throughout 2015?
- What was the total dollar value of produce purchased from Viva Farmers by Viva in 2015? Sold?
- How much produce (\$value) was donated in 2015?
- How much food was sold to food banks daycares, schools in 2015?
- How many clients did Viva sell to that were food banks, daycares, schools, hospitals, and other community markets that increase food access?
- How many farms used cover crops in 2015?
- Did Viva do soil tests in 2015? How were the results used?
- What are some of the environmental farming practices that Viva promotes?
- Do you have any success stories that you have observed in farmer growth?

# Viva Farms Case Study

## FARM INCUBATOR PROGRAM IMPACT EVALUATION PRELIMINARY REPORT

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November 2016

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## Background and Context

Viva Farms is a non-profit farm incubator organization in Skagit County, Washington. The Viva Farms Incubator is located on a 33-acre piece of land leased from the Port of Skagit Property near Burlington, approximately 70 miles from Seattle and 30 miles from Bellingham. The farm incubator was founded in 2010 as a collaboration between the Viva Farms founders, Washington State University (WSU) Skagit County Extension, and the Port of Skagit. The Viva Farms mission is to launch the next generation of farmers. With the goal to reduce the barriers to entry for beginning farmers, Viva Farms provides access to the top five essentials for farming including land, infrastructure, markets, capital, and training.

Infrastructure includes access to a greenhouse, barn storage space, water, cooler, wash pack station, and computer access. Viva Farms collaborates with WSU Extension and other local organizations and agencies to offer farming workshops for the public and participant farmers. The Incubator Program is open to all beginning farmers who qualify and is structured and offered bilingually in Spanish to meet the needs of the Latino population in Skagit County. Viva Farms became Certified Organic in 2014. By 2016, all farmable land was leased by farm incubator participants. Since 2010, Viva Farms has incubated 28 individual farm businesses. Since the founding, Viva Farms has helped support over 500 beginning farmers through trainings and workshops.

Viva Farms operates a wholesale marketing program and a seasonal farm stand to sell participant farmers' produce. In 2015 Viva sold 75% of the produce it purchased from Viva farmers through wholesale markets, with another 25% of sales through the farm stand. Farmers also market their own produce through local farmers markets, CSAs, and wholesale accounts.

In order to participate in the Viva Farms program, participants must present a production plan and farm business plan. This can be achieved by taking the WSU Cultivating Success courses or through previous experience. Starting in 2016, Viva began facilitating the FIELD Program, a hands-on farming practicum program offered for credit through Skagit Valley College Sustainable Agriculture Education Program.

Participants are required to take the practicum course to farm a  $\frac{1}{2}$  acre of land as a group before leasing their own farm plot. Extensive farm experience can count towards fulfilling these requirements. After completing these requirements, participants are eligible to lease between  $\frac{1}{4}$  acre and 5 acres of land through Viva when available.

The question of who will be the next generation of farmers has been a recent focus of national discussion and funding programs. In the United States, our current farmer population is aging with 62% over the age of 55 (USDA Agriculture Census, 2012). By 2030, it is estimated that 500,000 US farmers will retire, 25% of current American farmers (Lusher Shute, 2011). Farm Incubator programs have emerged as farmer training initiatives to support the new generation of farmers, with 119 operational programs around the United States in 2015 (National Incubator Farm Training Initiative, 2015). Farm Incubators are programs that aim to support new farmers gaining skills to launch a farm business by reducing barriers to entry including access to land, infrastructure, equipment, markets, capital and training (Massey, Sullivan, & Creamer, 2014). Although there has been much growth in beginning farmer training programs, there is little research that has focused on understanding the role they play in food systems and community development (Niewolny & Lillard, 2010).

In 2013 Viva Farms collaborated with the WSU Extension Small Farms Program on a Specialty Crop Block Grant funded by the Washington State Department of Agriculture to fund a graduate project to conduct an impact evaluation of the Viva Farms Program. This case study of the Viva Farms Incubator Program aims to evaluate the social, economic and environmental impacts of the program. This evaluation was conducted through interviews and surveys with current and past participants, participant observation as well as Viva Farms staff interviews. Our descriptive case study aims to assess the extent to which the Viva Farms Incubator Program contributes to a sustainable food system through successful training and support of beginning organic farmers.

As farm incubators surface across the country as a method to train the next generation of farmers, it is important to evaluate the effectiveness and impact of these programs to improve future programming and to share best practices. Funders and other partners are also eager to assess the value of investing in these burgeoning numbers of farm incubator programs.

## Evaluation Methods

We used qualitative and quantitative methods to conduct the impact evaluation for this research project. This evaluation was conducted through interviews and surveys with current and past participants, participant observation, and Viva Farms staff interviews. We analyzed responses and data from the end-of-season interviews with 12 current participants and 10 interviews with past Viva Farms participants. The selection of our interview participants included all current and past participants.

Interview and survey questions were designed after Agriculture and Land-Based Training Association's End of Year Interviews and a study of the University of Santa Cruz Apprenticeship in Ecological Horticulture conducted by Perez et al. in 2010 (Martin, Bernau, Lindsay, Perez, & Landeck, n.d.)

We analyzed responses and data from 2015 End of Year Surveys conducted in November and December with fourteen 2015 Viva Farms Participants as well as conduct interviews with eight previous participants and thirteen follow-up interviews with current participants during spring and summer 2016. The case study also included unstructured interviews with Viva Farms Staff members and general participant observation. Ongoing participant observation included shadowing farmers during operations, attending professional development meetings and Monthly Viva Farmer meetings, all of which helped develop themes for analysis. This also allowed development of trust with participants to fill out farmer narratives. Data gathered from surveys and interviews was analyzed to create an impact analysis. Results were additionally compared with national data from the USDA Agriculture Census data.

Viva Farm staff contacted past Viva Farms participants via phone and email in May 2016 to share the purpose of the study and invite to participate in the study with a scheduled interview at their farm. In June 2016, we sent follow-up emails and phone calls. Additional follow-up included phone calls, messages, email invitations, and contact again from Viva Farms and from the previous leadership. The interviews consisted of a visit and a structured interview that was audio-recorded with participant consent. We conducted structured interviews in person and over the phone when necessary. Interviews ranged from 20min to 60 minutes. Interviews were conducted in Spanish (9) and English (13). Additionally, secondary data was collected through survey results and Viva Farms materials. (Goldberger, 2008)

## Response Rate

According to Viva Farms records, 28 farm businesses have participated in the program since 2010. The program transitioned leadership in 2014 and the new practicum program began in 2016. Viva Farms provided contact information for all 28 farm businesses. We were able to contact and conduct interviews with 22 of the 28 farm businesses, a response rate of 79%. The remaining six participant farms were unreachable through various outreach methods including phone, email, and contact with previous organizational leadership. One participant declined participation in the interview, stating that her husband was no longer involved at Viva Farms. Two past participants who were unreachable appear to be currently farming. There was no observable pattern or response bias in the reason for not participating in the evaluation. If the total is adjusted for the two phone numbers that could not receive messages, 22 of the 26 farmers who were invited to participate in the study chose to do so. This leaves an adjusted response rate of 85% which is quite high and increases the likelihood that these results are representative.

TABLE 1. REASON FOR NOT PARTICIPATING IN INTERVIEW	NUMBER OF PEOPLE
Disconnected phone number	1
No answer and no message	1
No response to phone or email message	3
Declined interview	1

## Participant demographics

### Age

Participants reported a mean (average) age of 42 years old. 25.9% of participants were 35 years of age or younger while 74.1% were 35 to 64 years of age, and no participants were older than 65 years of age. The average age for all primary farm operators nationally is 58.3 years old (USDA Ag Census, 2012).

<b>TABLE 2. AGE</b>	<b>VIVA FARMS PARTICIPANTS % (2015)</b>	<b>BEGINNING FARMERS NATIONALLY 1 TO 5 YEARS ON CURRENT FARM (2012 AG CENSUS)</b>
Less than 35 years	25.9%	14%
35 to 64 years	74.1%	70%
65 years +	0%	16%

## Gender

Participant respondents at Viva Farms were 40.7% female farmers, while nationally women represent only 18% of farmers (Ag Census 2012 Highlights, 2014). Generally, incubator farms nationally support higher numbers of female farmers than the national percentage, with an average of 48% female farmer participants reported in 2015 (National Incubator Farm Training Initiative, 2015).

<b>TABLE 3. GENDER</b>	<b>VIVA FARMS PARTICIPANTS (2015)</b>	<b>BEGINNING FARMERS NATIONALLY 1 TO 5 YEARS ON CURRENT FARM (2012)</b>	<b>INCUBATOR FARMS NATIONALLY (2015)</b>
Male	59.3%	82%	52%
Female	40.7%	18%	48%

## Refugee/Immigrant

While we included this demographic metric in the interviews, we decided not to include these participant ratios in the report. There are no current national statistics on refugee/immigrant farmer ratios and additionally participant responses showed that the identification of the label immigrant or refugee varied based on the participant's own perspective of the reason for migrating to the US.

## Race/Ethnicity

Race/Ethnicity varied greatly from nationally demographic breakdown. While nationally minority farmers make up only 10% of the population, 51.9% of Viva farmers are minorities.

<b>TABLE 4. Race/Ethnicity (n=27)</b>	<b>Viva Farms participants % (2015)</b>	<b>Beginning Farmers Nationally 1 to 5 years on current farm (2012 Ag Census)</b>
White	48.1%	90%
Minority	51.9%	10%
Latino	22.2%	
Indigenous Latino	22.2%	
Asian American	3.7%	
Other	3.7%	

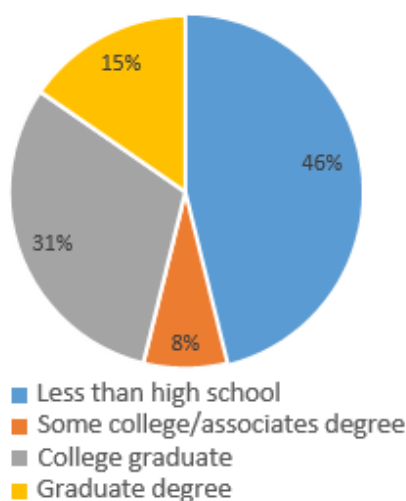
## Education level

Viva Farm participants have a range of educational backgrounds from less than third-grade education to university master degrees. Field programming has been shown as an effective educational strategy accessible to all, even those with limited or low levels of education (Davis et al., 2012).

<b>TABLE 5. EDUCATION LEVEL (N=26)</b>	<b>VIVA FARMS PARTICIPANTS</b>
Less than High School	46.2%
Some College/Associates Degree	7.7%

College Graduate	30.8%
Graduate Degree	15.4%
PhD	0%

**FIGURE 1. PARTICIPANT EDUCATION LEVEL**



### Previous farming experience before Viva Farms and Goals for Farming

As a program open to all aspiring farmers, participants of Viva Farms have a wide variety of experiences in agriculture previously ranging from no experience to those that have been farming all their lives. Experience ranged from no experience to 45 years (since childhood) with an average of 10 years of experience farming. As several participants worked as farmworkers before transitioning to farm owners, therefore that level of field experience contributed to a high average.

<b>TABLE 6. EXPERIENCE FARMING (N=22)</b>	<b>YEARS</b>
Average	10
Median	6
Minimum	0
Maximum	45

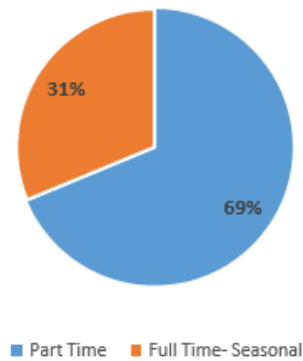
Participants enter the program with different initial goals for agriculture. Eleven (52.4%) of the participants indicated that their goal when they started at their farm business was to eventually have farming be their primary source of income. Eight (38.1%) of the participants identified their farming goal was to have it be a secondary source of income while only two (9.5%) cited their goal for farming as the quality of life. Many farmers commented that quality of life was part of their farm goals. No participants indicated that they started the program only to get a job in agriculture (without the goal of owning their own farm) although several participants since participating have worked in agriculture (see Table 8).

<b>TABLE 7. GOALS FOR FARMING</b>	<b>N=21</b>	<b>PERCENT</b>
Primary Source of Income	11	52.4
Secondary Source of Income	8	38.1
Quality of Life	2	9.5
Job in Agriculture	0	0

### Work on the Farm

31% of those farming in 2015 reported Full Time Seasonal work (more than 35hrs per week per operator) while 69% reported Part-Time work on their farm with work off the farm. Nationally, 77% of beginning farmers on the current farm for 1 to 5 years worked off the farm (Ag Census 2012 Highlights, 2014).

**FIGURE 2. PARTICIPANTS WORK ON FARM**

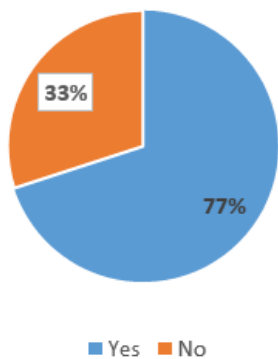


# Program Impacts

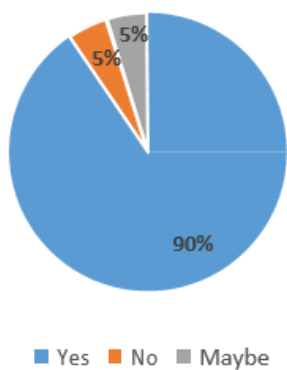
## Percent of Participants Farming

A full 77% of respondents (current and past Viva Farms participants) reported farming in 2015, including three participants indicating that they farmed mostly for home consumption that year. That percent increased to 82% (eighteen) that farmed in 2016 and 90% of participants (nineteen) reported planning to farm in the future. Those that did not farm in 2015 or 2016, but indicated that they planned to farm in the future included those currently looking for land, planning to purchase land and/or developing their production plans.

**FIGURE 3. PERCENT RESPONDENTS FARMING IN 2015 (N=22)**



**FIGURE 4. PERCENT OF VIVA PARTICIPANTS PLANNING TO FARM IN THE FUTURE (N=21)**



## Acres Farmed in 2015 and 2016

In 2015 Viva Farms participants reported farming on a total of 32.78 acres including 13.2 acres outside of Viva. The average acreage farmed was 1.56 acres with the smallest acreage at .03acres and the largest acreage at 10 acres. For the 2016 season, Viva Farms participants reported farming on a total of 47.71 acres. One participant shared the important role Viva Farms played in access to acreage:

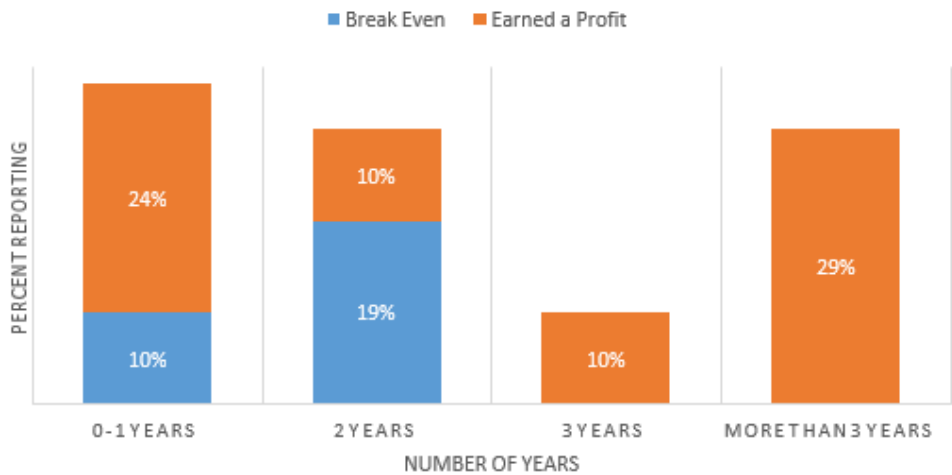
*The biggest thing that Viva has done is in terms of entry, to have a farm at all. Without Viva, I wouldn't have done it. I looked at leasing from a farmer but it was in horse pasture and it would have been difficult and maybe wouldn't have had water or equipment and would spend time trying to find implements.*

Economic Impacts of the Program

Years to Profit

Five (24%) participants responded earning a profit in the first year while two (10%) stated they were able to cover expenses and breakeven year one. Two (10%) farm businesses shared they were able to earn a profit and four (19%) were able to break even during year two. Two (10%) more participants reported earning a profit starting year three and six (29%) participants shared that it took more than three years to earn a profit.

FIGURE 5. NUMBER OF YEARS TO EARN A PROFIT

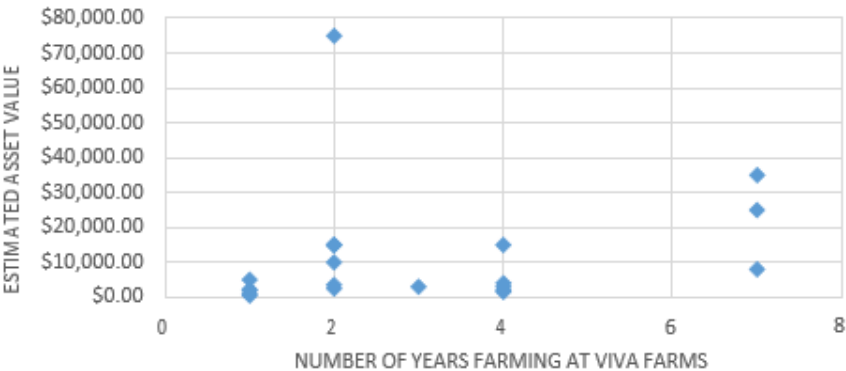


Total Assets

Participants reported an average total farm asset value of \$11,581 with a median of \$4,000. Participant assets include tractors, implements, tools, greenhouses, irrigation systems, storage containers, processing equipment and more. One farm shared the role Viva Farms played in their farm investments:

*Being at Viva I think is the reason we could invest so much and acquire assets that are very specific to our business model and not have to acquire the basics. And I guess we will have to go back and acquire those basics once we move out on our own but it is partly what has allowed us to scale up to a certain stage that will hopefully allow us to reach financial viability sooner.*

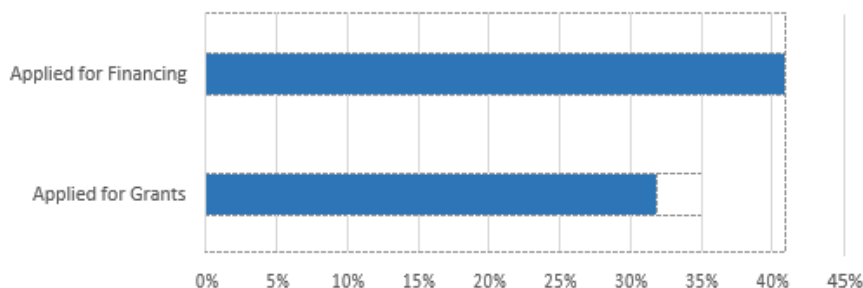
FIGURE 6. FARM ASSETS BY NUMBER OF YEARS AT VIVA FARMS



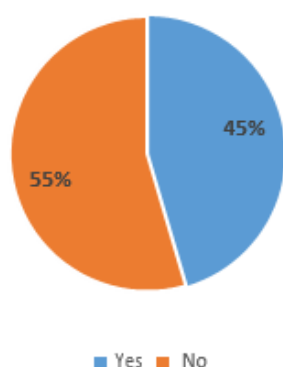
Participants accessing capital: Grants and loans

Since starting at Viva Farms, 32% of participants reported having applied for grant funding while 43% reported having applied for financing for their farm business. These access to capital opportunities have included USDA NRCS, USDA Value Added Producer, Community and local foundation grants. Financing has included local banks and credit unions, and the Viva Farms Matching Funds Program. Ten participants (45%) stated they had received financing or grants since participating at Viva Farms.

**FIGURE 7. PERCENT RESPONDANTS THAT APPLIED FOR GRANTS AND FINANCING**



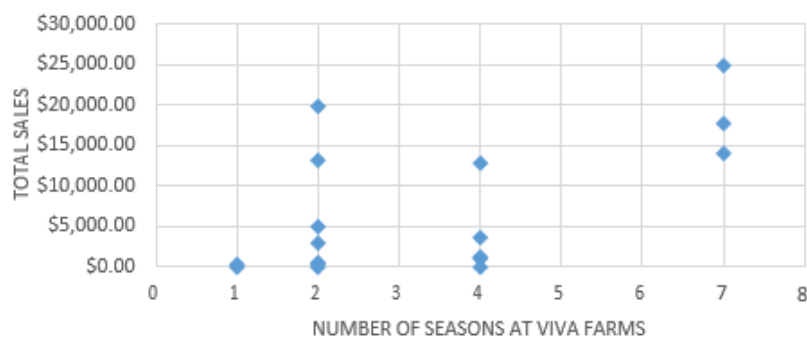
**FIGURE 8. PERCENT RESPONDANTS THAT HAVE RECEIVED GRANTS OR FINANCING**



## Farm Revenue

Fifteen farmers reported farm revenue for 2015, with average total sales of \$6,945.70, average expenses of \$5,197.86 and an average net farm income of \$2,865.75. These numbers are self-reported and may not include all sales outside of Viva Farms. The USDA average agricultural sales for beginning farmers with 1-5 years on the current farm was \$106,197 with average expenses at \$96,673 (Ag Census 2012 Highlights, 2014). Economically, the small scale of plots and operations does not currently compare with national averages of gross sales and income for farmers on current land 1-5 years in the USDA Agriculture Census, but we must take into account that national averages include generational farms with much larger tracts of land and infrastructure. National census average also indicates only years on the current farm and could include those that have previous farm management experience and have transitioned onto a new farm. These averages are comparable with other farm incubators. Average gross revenue per acre for Viva Farms participants farming in 2015 was \$8860 and ranged from as little as \$0 for a perennial crop not in production yet up to a high of \$43,600 per acre.

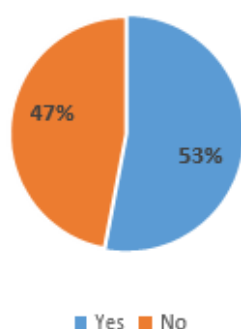
**FIGURE 9. 2015 TOTAL SALES BY  
NUMBER OF SEASONS PARTICIPATING AT  
VIVA FARMS (N=15)**



### Percent of Viva Farms operators with net gain

Of the past participants that farmed for business (n=15) in 2015, 53% ended the season with a net gain. Responses differed based on whether farmer time and labor was included. Nationally, 39% of operators with 1 to 5 years on current farm reported a net gain, while 37% with 6-10 years on current farm reported a net gain (Ag Census 2012 Highlights, 2014).

**FIGURE 10. PERCENT RESPONDANTS  
REPORTING NET GAIN IN 2015**



### Marketing Channels

Participants reported selling farm products through various marketing channels including the Viva Farms Wholesale program and Farm Stand, Puget Sound Food Hub, local restaurants, farm stands, stores, farmers markets, CSAs, schools, daycares, food banks and community organizations. The number of sales outlets per farm ranged between one and five, with an average of two of sales outlets per farm. Several participants shared the important role Viva has played opening markets and communicating with clients. One farmer shared:

*The Viva Farms produce sales are very important, if it weren't for this we wouldn't be very successful, especially me, because I don't speak English well, so for me, it is an advantage, but I think also for the majority. Well for me this is a lot of help. If it weren't for this, since I don't speak English, it is really difficult to communicate to the markets.*

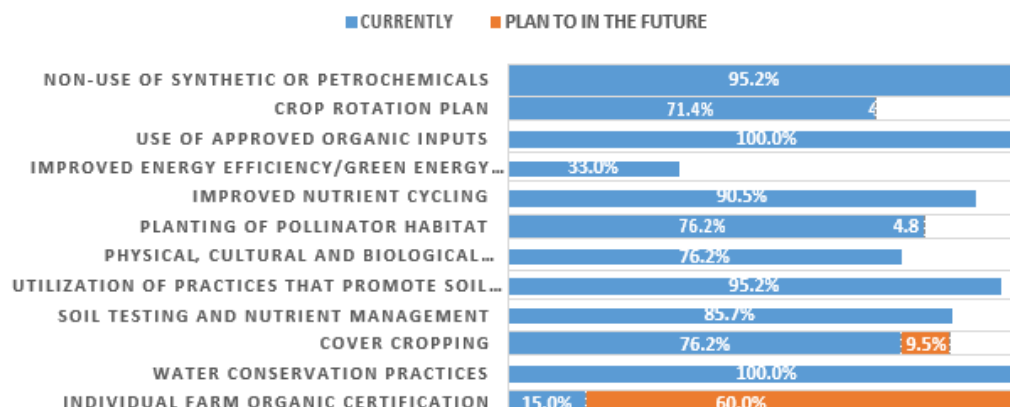
### Environmental Impacts of the Program

#### Use of Sustainable Agriculture Practices

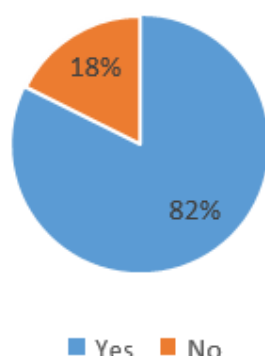
The Viva Farms program has a goal of training farmers to use sustainable agriculture practices applicable to their operation at Viva Farms and into the future. We measured participant utilization of sustainable agriculture practices as a measure of environmental impact, recognizing the environmental value of these practices through documented research. 76% of respondents utilized cover cropping, shown to improve soil health and fertility as well as contribute to reduce nutrient leaching and increased carbon capture (Poeplau & Don, 2015). 100% of participants utilized water conservation methods, primarily drip tape and micro sprinklers in their production. 82% (fourteen) of respondents farming in 2015 (seventeen) were certified organic under the Viva Farms organic certification. In 2016, two farms (15%) obtained their individual certification in 2016 while an additional twelve farmers (60%) responded that they are

interested in individual organic certification in the future. Even those that did not currently have their certification stated that they practice non-use of synthetic and petrochemicals on their farms. Additionally, 76% of respondents shared that they plant pollinator habitat, contributing to crop and pollinator diversity. While not a direct measurement of the environmental impact of these farms, the high adoption rates of these agricultural practices indicate a more sustainable and lower impact farming system in reference to soil health, water conservation, pollinator habitat, synthetic residues and water contamination, and carbon sequestration.

**FIGURE 11. PERCENT OF RESPONDANTS REPORTING USE OF SUSTAINABLE AGRICULTURE PRACTICES (N=21)**



**FIGURE 12. RESPONDENTS FARMING IN 2015 THAT WERE CERTIFIED ORGANIC (N=17)**

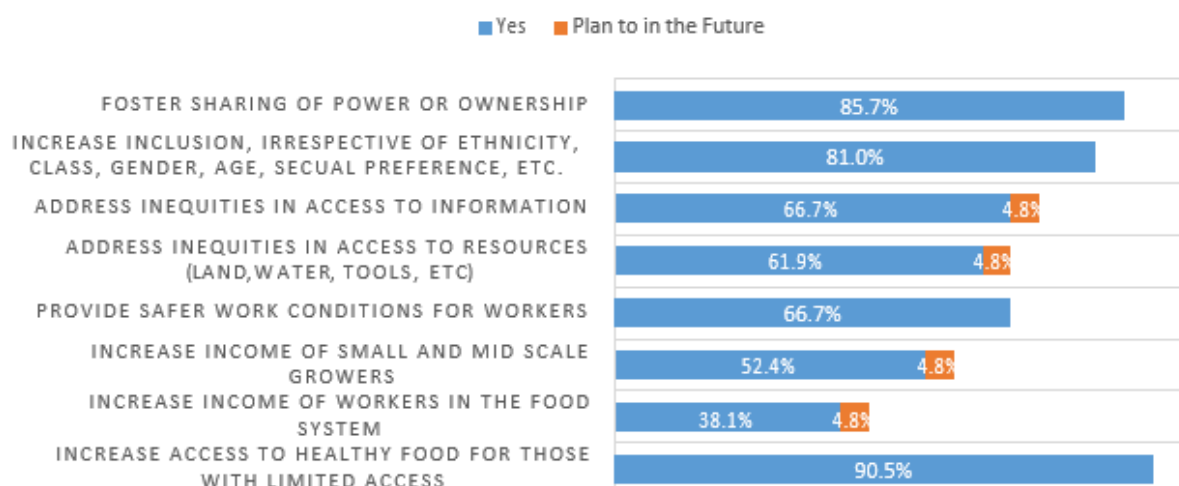


## Social Impacts of the Program

### Social contributions to a Sustainable Food and Agriculture System

Outside of economic and environmental impacts, farm incubator programs and the participating farms have substantial social impacts. Participants shared impacts of the program for both the community and for them personally. In terms of food access, 90.5% of respondents shared that through their farm and/or work they had increased access to healthy food for those with limited access. Additionally, 60% of respondents shared that they had increased the worker safety for workers, often times including themselves and their families as previous farmworkers.

**FIGURE 12. PERCENT OF RESPONDENTS REPORTING SOCIAL CONTRIBUTIONS TO A SUSTAINABLE FOOD SYSTEM THROUGH THEIR FARM OR WORK (N=21)**



**TABLE 8. PARTICIPANT ACTIVITY FOR A SUSTAINABLE FOOD SYSTEM**

	Yes	Percent
Work in Agriculture and Sustainable Food System Field	15	68%
Volunteer work for Sustainable Food and Agriculture System	11	50%
Family Consumed Produce	16	73%
Shared, Bartered or Sold Produce to Friends and Family	14	64%
Sold or Donated Produce to Food Banks, Schools, Daycares and Community Organizations	9	41%

In 2015, 73% of respondents (n=21) reported that their family consumed produce they grew, 64% reported sharing, bartering or selling produce to friends and family and 41% sold or donated produce to food banks, schools, daycares and community organizations. In 2015 Viva Farms reported selling \$9,045.40 in produce to local food banks. Although it is difficult to estimate the impact that these farmers and the Viva Farms program has on community food security, it is apparent that the fruits and vegetables produced at Viva Farms contribute to the local consumption of healthy food. Additionally, 68% of participants have worked in Sustainable Food System Field outside of running their own farm businesses and 50% of participants (eleven) volunteered in the community for a more sustainable food and agriculture system. These work and volunteer positions include work at food banks, farm stores, seed companies, service on community organizational boards, farmers market management, farm management and more. The contributions of these participants go beyond the farm and play a role in shaping a community food system that integrates sustainable agriculture and healthy food.

#### Skills useful in other areas of life

When asked whether the skills received and built upon at Viva were useful in other areas of life outside of business, 59% participants responded “yes.” The two most common responses included improved financial and budgeting skills and community involvement and networking. Other responses included helping to get a better job, gaining new knowledge to be used in the current job, and agricultural experience. Specific responses included:

*General skills in entrepreneurship, collaboration and working within a system and responding to challenges and barriers.*

*One thing that comes to mind immediately is the immense outreach and the community of people that I was able to meet, including farmers across the state.*

*Financial skills and budgeting skills as well as managing and making lists. Those skills helped me be able to buy a house with land last year.*

Beyond these social contributions, participants shared other ways the program had impacted them personally. These included the creation of community and a support network with other participants and local farmers, cross-cultural interaction, and an improved understanding of the food system. Additional observations included improvements in housing status of participants including purchase of land and houses. One farmer mentioned he was able to purchase a doublewide trailer with his first year earnings from Viva Farms. Three other farmers were able to purchase a house and land in 2016. A few additional comments from participants are listed below:

*Culturally I learned more about farmworkers in the county...I realized how privileged I am and so many things that I take for granted.*

*Part of the community aspect was that it drew in farmers from the area that were interested in what was going on. We wound up getting connected with some people that had really valuable advice to give or were able to offer services to other farmers for a reasonable rate. Connecting with the broader community.*

*I think it has been a really good education for me as far as the logistics of food. We wouldn't be doing what we're doing without Viva. It's great having neighbors to exchange ideas and create friendships.*

### Reasons for leaving the program

Past participants were asked about reasons for leaving the program. Responses varied case by case but included reasons such as the family moved, they purchased land, they were ready to launch and lease their own farmland, they realized it was financially and physically unsustainable at their age, and they had frustrations or miscommunications with management. A common difficulty shared by several past participants was the time during the transition in organizational management, which impacted participants' decisions to continue with the program. Another participant cited a conflict with an organizer over crop management. Another participant that has been at the incubator since the founding shared "I wouldn't still be here if I had access to another place to transition to". This brings to attention the need for continued support after the incubator and recognition that the incubator alone cannot solve issues of access to resources for socially disadvantaged and beginning farmers (Calo & De Master, 2016). There must be collaboration and support from the farming community and agencies to aid in the transition after participation at the incubator. This also supports the need for a Viva Farms 2, an additional plot of land for experienced incubator farmers to transition to with less support but continued access to resources.

### Program Reflections

Throughout the interview process, participants shared reflections on the value of the program. Some of the comments are shared below:

*The program opened doors for those that want to continue experimenting.*

*The program was very useful. Although some of the projects were difficult due to my limited English skills, Viva Farms has everything to help a person start their farm business.*

*The program is very helpful for any farmer who wants to continue.*

*You learn everything, I think that I'm lacking a little bit on business and pricing, but we're learning. What helps me here from Viva, there is water, the cooler, there's a lot that helps me, the cooler, the tractor, these important things, including for me who doesn't have a tractor, for just starting I think it is a lot of help for everyone, for those who are starting. Because to buy a tractor it's, wow, a lot of money.*

*Viva was paramount in helping me get started. It pushed me to have a farm plan and figure out what I was doing.*

## Recommendations

Participants shared various recommendations during the interviews and surveys for improving the Viva Farms program. These recommendations are from both past and current participants and may not take into account changes that staff have recently put in place.

- **More technical assistance on farm and integrated support.** One participant shared that it would have been helpful to have had the Practicum Program available previously, as it would have given the support needed for an introduction to farming on a scale larger than gardening.
- **Increased long-term support for and communication with graduates.**
- **More structured activities to bridge cultural gaps and community building activities.**
- **Incorporation of other farming techniques outside of the commercial farming focus.**
- **More sessions on business planning and updating business plans in the offseason.**
- **Recognize and remember the work that went into creating Viva Farms and the efforts that farmers put in initially to build the opportunity.** One farmer shared “*We are here because of the people who extended their hearts and hands to create this. They opened the doors and markets, we built everything together. With unity there is strength.*”

## Conclusions

The Viva Farms program is a unique program that provides access to critical resources for beginning farmers. Viva Farms has been successful in training and supporting organic beginning farmers in Northwestern Washington, as shown by the 77% of participants who were farming in 2015 of which 82% were certified organic. The overwhelming responses showing that 90% of participants plan to continue farming in the future shows a commitment of participants to farming and the process of launching and building a farm business. Additionally, the Viva Farms Incubator has increased access to farming for minorities, those with limited levels of education, and women. The lower average farmer age also contributes to successfully meeting the mission of training the next generation of farmers. Through participant responses, it has been determined that the program contributes significantly to community food systems as well as the adoption and utilization of sustainable agriculture practices. Findings suggest that the Viva Farms program is meeting its goals and is contributing environmentally, socially, and economically to a sustainable food system.

These findings can be utilized for future program improvements and also for setting realistic baselines for farm incubator outcomes nationally. The sharing of this information will help to understand the challenges and successes of beginning farmers and improve future training. Additionally, this information and future evaluations can support programs to effectively communicate impact to funders, future farmer participants, and the community.

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**Project Title:** Promoting BioControl through Hands-On and Web-Based Training

**Partner Organization:** Washington State University (WSU)

## **PROJECT SUMMARY**

Biological control has always been a part of tree fruit Integrated Pest Management (IPM) in Washington, but for four decades it has operated in an organophosphate dominated environment. Over the past decade, the insecticides used to control key pests in tree fruit production have transitioned to those safer to humans. However, an unanticipated result has been a destabilization of biological control in IPM programs, which has resulted in secondary pest outbreaks and additional pest control costs. Many crop consultants and orchard managers do not have an understanding of how biological control functions and how to conserve natural enemies within the new IPM programs. There is a great need to address the lack of knowledge of biological control and its value in tree fruit systems.

A five-year Specialty Crop Research Initiative (SCRI) funded grant, “Enhancing Biological Control in Western Orchard Systems”, generated new information on the effects of organophosphate-alternative insecticides on biocontrol agents, developed new monitoring tools for natural enemies revealing their presence in orchards, and is developing models to predict when natural enemies are present in orchards. However, with the completion of that SCRI grant in 2013, its outreach activities also ended. Because of the persistent need for continued education about biological control in orchards the WSU Enhanced Biocontrol Outreach Team was determined to provide more outreach and education through this project. Crop consultants and growers need a means to determine the status of biological control in their orchards, knowledge of which organophosphate-alternative insecticides disrupt biological control and how that happens, and how to mitigate potential secondary pest flare-ups. Knowing what natural enemies are in the orchard is a first step, however, based on interactions during the SCRI project, many crop consultants, growers, and orchard managers do not recognize the different life stages of common natural enemies.

This project was not built on a previously funded SCBGP project.

## **PROJECT APPROACH**

**Goal 1:** *Increased knowledge and adoption of conservation biological control as part of IPM.*

**Workshops:** The WSU Enhanced Biocontrol Outreach Team conducted five biocontrol training workshops (each 4 hours long) in various locations in Washington State with a total of 67 participants (growers and consultants). To gauge how much knowledge participants gained from the training activities, survey answers given before the workshop were compared to results from quizzes held during the workshops. The participants already had a relatively sound knowledge of natural enemies prior to the workshop (66% correct answers before and 72% after), partly because some had taken this workshop during the previous year. Participants significantly increased their knowledge in other areas related to natural enemies, such as habitat needs and insecticide effects (53% and 25% increase in correct answers, respectively). All workshops were held in English, although there were a number of Hispanic participants who then helped one another in Spanish to comprehend the materials.

**Online course:** The online course, which is based on the content of the workshops, was partially developed. It is divided into two modules: the first module teaches about common natural enemies in orchards, their developmental stages and characteristics, their prey or hosts, and it lets users hone their skills in identifying important natural enemies; the second module describes monitoring tools and phenology models for natural enemies as well as effects of certain insecticides on them. The course ends with a case study that applies many of the new principles learned. Users will be able to earn pesticide applicator recertification credits upon passing a test. The completion of this online course has been delayed, but additional resources are being secured to complete it. To date, the online course version of the course’s introduction has been completed and reviewed, with only minor edits needed. The storyboard, narration and video/image materials for the remainder of the first module are finalized as well as the storyboard and script for the second module. Narration and image materials still need to be compiled for the second module, before the storyboards can be transformed into the online course format.

In addition, the team has catalogued available images and documented any additional media needs. Numerous insect specimens were collected from the field and photos and videos have been taken. This activity overlaps with the development of a mobile ID app, where insect images and videos collected will be used.

**Pesticide use analysis:** USDA NASS data was gathered and analyzed for trends for the period of 2007-2011. The main focus for the analysis was the change in insecticide use for codling moth control in tree fruit. No NASS data were recorded in 2013, and the 2014 NASS records were not available at the time of this report.

The pesticide survey data show that the number of acre applications of organophosphate insecticides for codling moth control, the major pest in apples, decreased over the years 1991-2011 with a plateau between 1999 and 2007. The decrease in use of organophosphate insecticides was due to a reduction in the acres treated, a reduction in number of applications and an increased use of organophosphate-alternative insecticides that replaced organophosphate insecticides for codling moth control.

The total pounds of active ingredient of organophosphate insecticides has been steadily reduced since 1991, but declined dramatically in 1999 and in following years due to the adoption of codling moth mating disruptions and organophosphate-alternatives. The major change resulting from adoption of organophosphate-alternatives for codling moth control (insect growth regulators (IGR), spinosyns, diamides, and neonicotinoids) has been the reduction in pounds of active ingredients applied to orchards.

For 2009 and 2011, insecticide use data was compared between regions: Chelan/ Okanogan/ Douglas counties vs. Yakima/Benton counties vs. the rest of Washington State. The survey data indicated that more applications of organophosphates and organophosphate-alternatives (diamides, neonicotinoids, spinosyns, and insect growth regulators) to every acre for codling moth control in the Yakima/Benton region compared to the Chelan/Okanogan/Douglas region. More focused outreach on effective codling moth control in the Yakima and Benton counties may help reduce the number of potentially unnecessary insecticide applications without jeopardizing fruit quality.

***Goal 2: Online and mobile ID guide for main tree fruit pests and natural enemies (eng & esp).***

Overlapping with the activities for the online workshop, the biocontrol outreach team has started the process of cataloguing media needs for developing an orchard insect pest and natural enemy mobile app. Also, insect specimens have been collected in the field to take photos that can be used in the online course as well as in the app. This objective has not been completed due to time constraints that arose from delays in the online course.

***Goal 3: Direct technology transfer of natural enemy monitoring tools to crop consultants.***

Seven cooperators participated in the natural enemy monitoring study in 2014. The cooperators were supplied with traps, lures, and other materials needed to monitor the green lacewing *Chrysoperla plorabunda*. Monitoring was conducted from March through September 2014. Five of the cooperators submitted monitoring data as well as spray records from their two orchard blocks they intended to compare. Data from four cooperators were analyzed, while one cooperator's information could not be used due to an incomplete data set combined with very low lacewing counts. Three of the cooperators were video-interviewed to capture their feedback regarding the new natural enemy traps as well as general considerations about biological control in orchards. Parts of those video interviews will be published after editing on <http://enhancedbiocontrol.org>.

Lacewing numbers captured in most pairs of orchard blocks did not reveal large differences due primarily to the similar insecticide control programs used. However, a general trend was that orchards using very "soft" pest control programs had the most lacewings, which confirms previous research findings. The general feedback from cooperators on use of traps was positive, similar to those from pest management consultants in 2012. The cooperators said they would embrace new monitoring tools for natural enemies once commercially available, but would like more clarification on the relationship between lacewing numbers in traps and the success of biological control. Additional research into these areas is needed.

*J.F. Brunner*, PI: Dr. Brunner oversaw the project, reviewed project activities, timelines, budget and reports, coordinated contacts with stakeholders, and provided conceptual guidance for objectives and goals.

*A. Gadino*, Co-PI: Dr. Gadino was involved in project management and activity coordination. She developed online course content, planned and conducted workshops and outreach, coordinated crop consultant collaboration activities and analyzed collected information from those collaborations.

*U. Chambers*, Co-PI: Dr. Chambers oversaw the project, reviewed and coordinated project activities and timelines. She generated course content and coordinates course development and implementation, plans and conducts workshops and outreach. She coordinated crop consultant collaboration activities and analyzed collected information from those collaborations during the second project year. She also generated the project reports.

*W. Jones*, web & communications coordinator: Mrs. Jones provided technical expertise for the online course development and compiled, generated and edited course materials, such as images and videos. She also assisted in workshop activities.

*WSU Global Campus:* WSU Global Campus, who has been a key partner in this activity, is the group that develops online courses for Washington State University and has expertise the original project team did not possess. This group has been assisting in assembling the course content into an interactive online format for this project.

Some of the natural enemies in tree fruit orchards also occur in other cropping systems and biological control principles are generally relevant to other cropping systems. However, the activities in this project solely address and focus on biological control in tree fruit orchards. Most non-specialty crops could benefit from the general principles of biological control presented in the online course but the more specific educational information would not directly apply to cropping systems, especially non-specialty crop systems. Workshops, on-farm natural enemy monitoring trials, online course and the natural enemy ID guide were only executed and promoted in the tree fruit industry in Washington State.

## **GOALS AND OUTCOMES ACHIEVED**

***Goal 1:*** *Increased knowledge and adoption of conservation biological control as part of IPM.*

***Workshops:*** Biological training workshops increased the knowledge about biological control of the 67 participants. The participants honed their skills in identifying common natural enemies in orchards and significantly increased their knowledge in other areas related to natural enemies, such as habitat needs and pesticide effects.

***Online course:*** The first online course version of the course introduction has been completed. About 90% of the materials for the remaining parts of the online course are assembled for their conversion into the online course format.

USDA NASS data from apple in Washington for the reporting period of 2007-2011 were used in the analysis and within these data only pesticides used for codling moth control were used. This analysis provides a baseline that can be compared with future NASS data to assess the trends in pesticide use and potential change in practice spurred by this and previous teams' efforts to promote biological control and use of softer, more selective pesticides for codling moth control.

***Goal 3:*** *Direct technology transfer of natural enemy monitoring tools to crop consultants.*

The participating cooperators were able to become familiar with the novel way of monitoring for green lacewings in their orchards. During the video interviews, all cooperators indicated that the new lure-baited traps were easy to use, but require additional time to check. The cooperators also said that the information the traps captured made it easy to "see" biological control activity in the monitored blocks. However, they did wonder how the number of lacewing caught in traps might relate to biological control of aphids, the common prey of green lacewings. Further research is needed to address this question.

The data collected from the cooperators were analyzed and summarized in conjunction with the spray records they provided. Information sheets with graphs and tables showing the seasonal changes in lacewing captures in the two different apple blocks were sent to each of the cooperators. These information sheets highlighted the pesticides that negatively impacted lacewing numbers. Data of the other cooperators were included (anonymously) to provide comparison to other pest management programs and resulting lacewing captures. The team has not inquired if this information may have influenced subsequent pest management decisions in order to conserve lacewing populations.

A long-term goal of this project was to increase the knowledge and value of biological control in the tree fruit industry. The hands-on workshops that were conducted did measurably increase the knowledge base of the participants. Similarly, the team expects to broaden the knowledge and boost the implementation of biological control for the rest of the WA tree fruit industry once the online course is available to the public.

Another medium to a longer-term outcome of this project was that the developed online course would provide a foundational framework on biological control principles and training materials that could apply to online training courses for other cropping systems and localities. This is still possible once the online course is complete. Materials that were developed, expertise gained, and lessons learned could be applied to other cropping systems or even in urban horticulture settings.

### **Established Goals**

***Goal 1 A:*** Conduct 10 workshops or have 100 people attending (offer in Spanish if requested)  
Analyze participants' knowledge gain. Compare knowledge before and after taking the workshops.

### **Accomplished Goals**

5 workshops held (total of 67 participants), all workshops in English  
6-53% knowledge gain, depending on subject area.  
No follow-up surveys or interviews conducted.

Follow up with interviews/surveys to document how participants may have altered their pest management practices.

USDA NASS data comparison between 2007-2011 and 2013

**Goal 1 B:** Create online course (English and Spanish) used by 50 individuals by September 2015.

USDA NASS data were only available for 2007-2011 and analyzed for that period; data for 2013 were not available as expected.

Course development (in English) to approximately 90% complete (plus conversion into online format by WSU Global Campus). Monitoring course use will begin when the online course is completed and implemented.

**Goal 2:** Develop mobile ID guide for major tree fruit pests and natural enemies.

Goal not accomplished. However, images and videos for this guide compiled and catalogued.

**Goal 3:** Recruit 20 volunteers to evaluate natural enemy monitoring tools.

Collect trapping data and pesticide use records.

Seven volunteers committed to participate; monitoring complete. Data and pesticide records provided by five collaborators; three collaborators were video-interviewed.

**Workshops:** With the hands-on workshops completed, about 60% (5 events with 67 participants) of the target audience (10 workshops or 100 participants) was reached. The workshop participants increased their knowledge about certain aspects of conservation biological control.

**Online course:** About 90% of the workshop materials have been prepared for conversion into an online format. This aspect of the project was certainly the most time-consuming phase, mainly as the team members went through a learning curve on how to best make slides come “alive” for an online and self-directed audience in a clear and intuitive, but engaging way.

**Technology transfer:** Many potential cooperators were contacted, but only seven volunteers (of the targeted 20 cooperators) committed to this additional effort in their daily operations. Nonetheless, the cooperators appreciated this hands-on learning opportunity and provided valuable feedback that will be shared with the tree fruit industry.

## **BENEFICIARIES**

This project directly benefits the growers, crop consultants and pest managers in virtually the entire Washington state tree fruit industry with its roughly 233,000 acres. In addition, the online course will be available to the general public (not only in Washington state) and can be relevant to students and other groups not directly associated with the tree fruit industry, but who are also interested in conservation biological control.

To date, 74 crop consultants and pest managers have directly benefitted from this project by participating in the workshops or the on-farm lacewing monitoring trial. In addition, the video-interviews of collaborators from a previous on-farm trial (same setup as in this project) have been viewed 138 times on YouTube alone (videos were also viewed on the enhanced biocontrol website, but numbers are not available). With the rollout of the online course, the number of beneficiaries will increase significantly. As a longer-term outcome, this project can save costs by reducing the number of pesticide applications and protect worker health and the environment. However, no quantitative data on regarding the number of course users and pesticide applications before and after taking the course could be collected during this project period as the online course was not completely finished.

## **LESSONS LEARNED**

The hands-on biocontrol workshops showed that most participants had adequate knowledge of natural enemies in orchards, but were less aware of the different developmental stages and the natural enemies’ biology. Many workshop participants had misconceptions about some pesticides’ negative effects on natural enemies. Overall, the workshop participants were very eager to learn more about biological control and felt that the workshops provided practical knowledge the participants would be able to apply to their orchard management. The workshop participants were very interested in using natural enemy traps and models and wanted to know when those new tools would be available to them.

Making an online course proved to be more time-consuming than initially expected. It takes a slightly different approach and skill to visualize the end result without having prior experience of developing an asynchronous online course. Clear communication of expectations and possibilities between the team developing the materials and Global Campus

converting everything into the online format was crucial and resulted in the excellent implementation of the course introduction.

For the on-farm trials the volunteer cooperators were asked to choose pairs of apple blocks that were managed differently and in which to monitor lacewings. However, based on the provided spray records, most orchard block pairs turned out to use very similar management programs. Therefore the orchard pairs did not reveal large differences in lacewing numbers. The general trend was that orchards managed with “soft” pesticides (those known to have no or a low negative impact on natural enemies) had the most lacewings, confirming previous research findings. The general feedback was positive and the cooperators would embrace this new monitoring tool.

The online course, in particular the parts dealing with natural enemy life stages and identification, required more effort to gather visual media (photos, videos, images) than expected. This was especially true for the identification exercises and self-assessment and credit tests as it was important to use different images of the same natural enemy so that users would actually learn to identify an insect instead of just recognizing the same image use over and over. The number of in-house media resources was often limited, low in quality or just did not exist. Searching for adequate resources, obtaining permission to use them, and creating new media consumed more time than initially expected, contributing to the delay of the completion of the online course.

Although interested in new natural enemy monitoring tools, many crop consultants that were contacted were unable to commit to weekly monitoring of 10 lacewing traps in two different blocks due to their already busy schedule. This limited the number of participating collaborators from twenty to seven, a number further reduced to five due to incomplete sets of provided data.

### ADDITIONAL INFORMATION

To date \$56,381.18 of in-kind match has been utilized. This match comes from Dr. Brunner’s salary for the time he contributed to this project. There was also in-kind contribution from WSU Extension to support WSU Global Campus personnel, but the exact dollar value spent so far for their time was not available for this report. However, the development of the entire course through WSU Global Campus is budgeted for \$20,000.

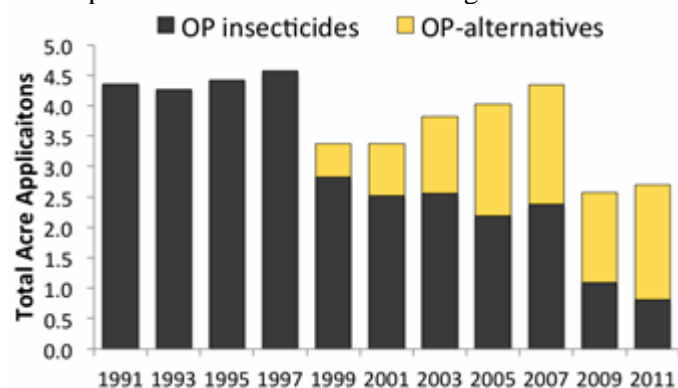


Fig. 1. Total acres applied for organophosphates (OP) and OP-alternatives to control codling moth in Washington State. (Acre applications = percent acres treated x average number of applications.)

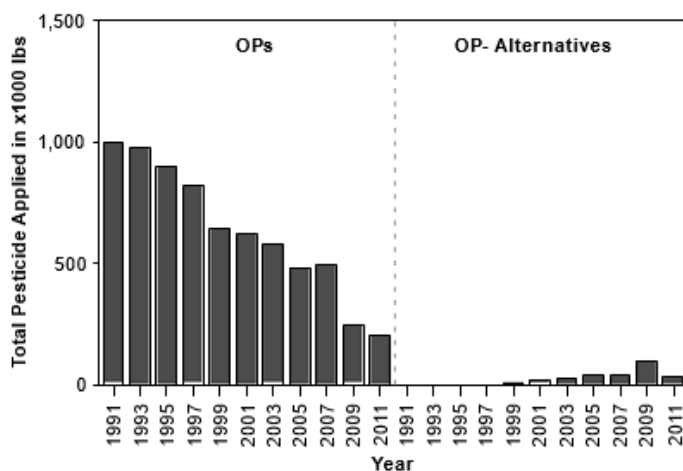


Fig. 2. Total amount of organophosphate (OP) and OP-alternative pesticides applied to control codling moth in Washington State.

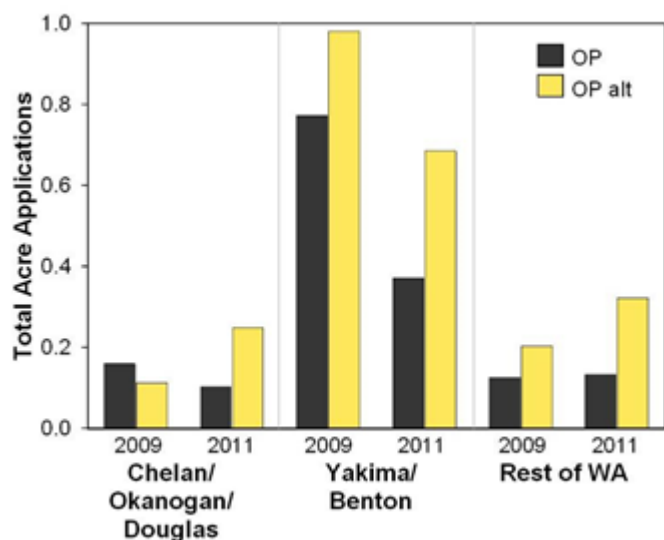


Fig. 3. Total acre applications of organophosphates (OP) and OP-alternatives (OP alt) to control codling moth in Washington State by region. (Acre applications = percent acres treated x average number of applications.)

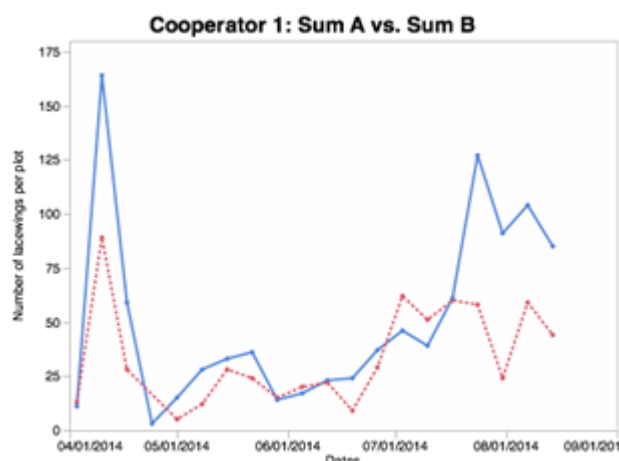
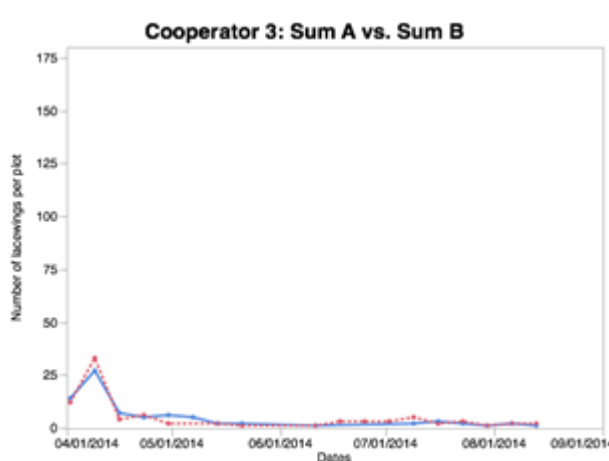
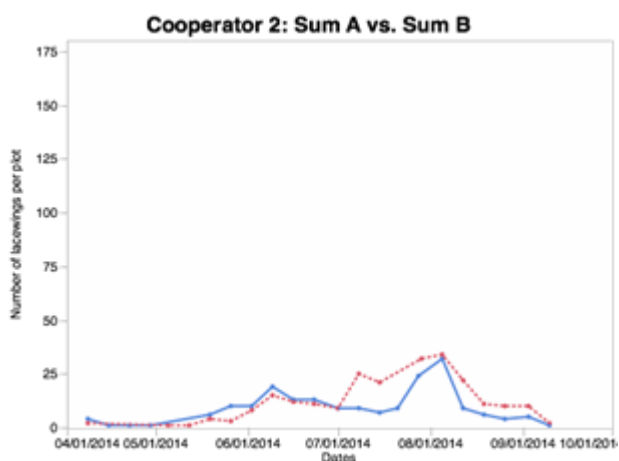


Fig. 4. Examples of cooperator lacewing trapping data. Blue and red line represent total lacewing numbers in two apple blocks that are differently managed for codling moth.



Below are screenshots from the online course introduction:



Menu

Notes

▼ Untitled Scene

Module 1A Introduction to Biol...

Introduction to Biological Contr...

Why We Need Pest Control

What is Integrated Pest Manage...

Cultural Control

Chemical Control

Biological Control

Behavioral Control

What is Biological Control?

What are Natural Enemies?

Pathogens as Natural Enemies

Parasitoids as Natural Enemies

Predators as Natural Enemies

**Types of Biological Control**

Importation

Conservation

Augmentation

Which Orchard Pests Are Best ...

Indirect Pests and Biologically ...

Direct Pests and Biologically C...


Benefits & Limitations of Biolo...

Module\_1A


## Types of Biological Control

Select an image to learn more about conservation, importation, and augmentation.


Conservation




Importation



Augmentation





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▶

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**Project Title:** Expanding Access to Specialty Produce in the NW through Variety Trials

**Partner Organization:** Organic Seed Alliance (OSA)

### **PROJECT SUMMARY**

There is a high demand for year round availability of locally grown specialty vegetable crops in Oregon and Washington. The two states hold similar climatic and agronomic challenges as well as highly sophisticated produce buyers that demand superior culinary qualities. Four key crops were identified by stakeholders as prime opportunities for expanding year round production in OR and WA - overwintering chicories, overwintering sprouting broccoli, winter cabbage, and storage onions. This multi-state project addressed the need by, 1) evaluating and promoting the agronomic and culinary qualities of these four priority crops, 2) developing markets for these crops by convening tasting/networking events and providing promotional marketing materials, and 3) facilitating access to seed of appropriate varieties. Market introduction of these crops provides farmers with increased sales during winter and early spring when income is normally low, and chefs, retailers, and consumers with expanded access to locally grown food. This project built off project partner's Northern Organic Vegetable Improvement Collaborative (NOVIC) and Organic Broccoli and Onion Trials (OBOT), two networks of breeders and farmers developing crops for the northern tier and NW region of the US. The long-term aim of this project was to address the need for developing organic and sustainable production practices and regionally-based domestic markets.

Washington and Oregon agriculture excels in production of high value specialty vegetable crops during the prime growing seasons, but the produce industry remains dependent on imported crops during the winter and early spring months. Farmers are eager to expand production of overwintering and storage crops to retain customers through the winter, "off-season". Chefs, produce retailers and the general public (through CSAs and farmers markets) increasingly demand locally grown vegetables of exceptional flavor and culinary qualities throughout the entire year representing a significant market opportunity. Overwintering chicories, overwintering purple sprouting broccoli, storage onions, and winter cabbage are four crops identified as prime opportunities to expand winter vegetable production by farmers, breeders and chefs in focus groups hosted at agricultural conferences and farmer's meetings in the Northwest (NW). Stakeholders also identified the need to identify varieties that meet both agronomic and superior culinary qualities adding value for both farmers and chefs alike. Winter crops often hold superior flavor in the NW, as cool temperatures tend to concentrate plant sugars offering superior culinary value. A NW produce distributor identified NW-grown cabbage as a priority in part due to impacts on the CA cabbage industry due to a new pest (the Bagra bug). Produce industry experienced peak prices and gaps in availability of cabbage in 2013 due to this pest. Winter crop of purple sprouted broccoli is ideally suited to the NW climate and growing in popularity among chefs and retailers. OR and WA are major producers of onions, but growers have expressed a lack of access to well-adapted, good tasting storage varieties for the region. Farmers have been frustrated by loss of availability of some hybrid onion varieties. Regional farmers and seed companies are eager to identify open pollinated varieties of these crops that could be grown for seed facilitating regional seed security. Chicories are in high demand by NW chefs and gaining popularity among the gourmet food buyers. The goal of this project was to facilitate production and market expansion of the four prioritized crops by conducting variety trials, hosting farmer-chef variety evaluation and networking meetings, and supporting market introduction through promotion of these regionally produced crops. Farmers and produce sellers stand to benefit from access to optimum varieties of these crops as well as the marketing support to educate and promote these crops to consumers.

This project was the first of its kind supported by SCBGP.

### **PROJECT APPROACH**

On-farm, replicated variety trials of purple sprouted broccoli, chicory, onion, and cabbage were conducted on organic farms in Western WA for two production cycles from 2014-2016. The variety trials provided produce of a wide range of varieties of each crop to use for the outreach and marketing events. Trial results supported farmers' introduction of appropriate varieties. All trials included both agronomic and culinary evaluations including participatory input from farmers and chefs on appearance and flavor evaluations. Trials were planted in a randomized, replicated design with three replications, and approximately 8-15 entries per crop in large enough plots to provide ample product for tasting, evaluations, and marketing purposes. Each year farmers were invited to view the crops in the field during the agronomic evaluations. A final report of results was published in the last year of the project and is being disseminated to stakeholders. The final trial report includes information on agronomic and culinary (flavor) evaluations and discussion of variety recommendations, production information, marketing information, and seed purchasing guidance to help facilitate introduction of these crops. The report includes information on seed sources and organic seed availability to facilitate access to the varieties by farmers and regional seed companies interested in incorporating them into their production.

Several public events were hosted each year to engage farmers, chefs and retailers in the project. Varieties from the trials were presented for taste evaluation and feedback at the events, but the events were also highly social with chef-prepared dishes of the focus crops and a social atmosphere to encourage networking among participants. These events were hosted at regional conferences and on- farm field days to facilitate broad participation. These networking events served several purposes, 1) engaging participants in the evaluation of the crops, 2) serving as a networking opportunity for farmers and produce buyers to meet and develop relationships to foster market introduction, and 3) to generate press about the crops and project intent to facilitate marketing efforts.

Organic Seed Alliance (OSA) researchers McKenzie and Colley managed all project research activities including coordinating and evaluating variety trials and authoring final trial report. Several farmers participated by hosting the trials on-farm and collaborating in variety evaluations. Culinary evaluation methods were developed in coordination with Selman at Oregon State University (OSU). Selman also assisted in coordinating and hosting outreach events and engaging press and related project marketing activities. Selman hosts the annual Culinary Breeding Network in Portland, OR and through that event developed several promotional opportunities. Grondin served as a contracted support to plan and facilitate outreach events in WA hosted at OSA research field days and at several conferences including the Farmer Fisher Chef Connection. WSU and OSA partner on programs in Jefferson County, WA. Through this partnership WSU assisted in promoting and hosting farmer involvement in field evaluations and outreach events. Pacific Consumer Coop (PCC) supported promotion of the project through an article in the PCC sound consumer publication. The Port Townsend Food Coop supported the project by participating in several outreach events and working with local growers on introduction of the crops to market. Organically Grown Company greatly supported the project by providing financial support and collaboration in the development of purple sprouted broccoli, expanding trials and production of this crop under contract with their growers, and collaborating on development of marketing materials to facilitate product introduction into retail stores.

This project focused solely on specialty vegetable crops. All research and associated variety evaluation/ networking events only presented specialty crops for farmers and chef's to engage in tasting sessions. All project promotion emphasized the target project crops and seasonal expansion of produce availability.

## **GOALS AND OUTCOMES ACHIEVED**

### **7. Describe the activities that were completed in order to achieve the performance goals and Expected Measurable Outcomes for the project.**

#### *Research activities/outcomes:*

Variety trials of all four crops were successfully grown and evaluated on organic farms in WA for two production cycles between 2014 and 2016. Data was collected on all crops and a final report of trial results was written in fall 2016. The report is available on the OSA website and will be promoted through a press release and social media throughout fall of 2016.

#### *Outreach activities/outcomes:*

A total of 13 variety tasting events were hosted in OR and WA during the project period (6 in WA).

Tasting events were frequently hosted in conjunction with a conference or other event that would help draw the target audience. Participants completed tasting ballots evaluating the varieties for flavor and to provide feedback on qualities. The events were highly social to facilitate networking among participants. Facilitated discussions were led, when appropriate, about the crop and varieties of choice. It is estimated that at least 1500 participants engaged in the tasting events during the project period. Details of the tasting events included:

#### **2013**

2/2/13 - 2/7/13, Organicology (tasting and roundtable), Portland, OR. 850 participants (estimated at least 400 attended tasting). Chicory and Cabbage. Cabbage prepared three ways, raw, in cole slaw, and in sauerkraut.

#### **2014**

1/30/14 - 2/2/14, 7th Organic Seed Growers Conference (tasting and sessions), Corvallis, OR. 450 participants, (estimated at least 250 attended tasting). Chicory and Cabbage.

2/24/14, Farmer-Fisher-Chef Connection, Seattle, WA (30 participants in focused tasting session).

Cabbage.

3/14. OSA Port Townsend tasting event. 10 participants. Purple Sprouted Broccoli and chicory.

#### **2015**

2/5/15 - 2/7/15, Organicology (tasting and session), Portland, OR. 850 participants, (estimated at least 400 attended tasting). Chicory and Cabbage.

3/25/15 – Organically Grown Company. 10 participants. Purple Sprouted Broccoli.

9/22/15, On-farm Variety Trial Workshop and tasting, Orcas Island, WA (25 participants). Onions.

9/28/15, Culinary Breeding Network, Variety Showcase, Portland, OR. 100 participants. Onions.

10/3/15, Orcas Island Farm Tour, Orcas Island, WA. 25 participants. Onions.

10/14/15, Organic Seed Alliance Farm Tour, Chimacum, WA. 100 participants. Cabbage, onions.

## **2016**

2/4/16 - 2/6/16, 8th Organic Seed Growers Conference, Corvallis, OR. 450 participants (estimated at least 300 participated in tasting). Cabbage and chicory.

3/9/16, NWREC Winter Vegetable Field Day, Aurora, OR. 75 participants. Purple Sprouted Broccoli, Cabbage, Chicory.

3/21/16, Farmer-Fisher-Chef Connection (session and tasting), Kenmore, WA. 100 participants. Purple Sprouted Broccoli.

9/27/16, OSA research farm field day, Chimacum, WA. 75 participants. Cabbage and onions.

### *Marketing activities/outcomes:*

The food and farming media has been very interested and engaged in project promotion with a major push on press over the winter 2015-2016. OSA's communications team has covered the project extensively on social media and newsletters and engaged press in project promotion including food blogs, agricultural news outlets, radio shows, and retail news outlets including the Capital Press and PCC Sound Consumer. A marketing flier was created in winter 2015-2016 to promote purple sprouted broccoli and chicory. The flier was distributed at project outreach events, and distributed to retail outlets through sales of these two crops by produce distributor, Organically Grown Company. Media interest is a strong indication that the timing of the project was in alignment with trends in the NW food scene. Media related to the project since the project start included:

## **2013**

- 10/1/13, Seed Broadcast <http://blog.seedalliance.org/2013/10/01/4097/>
- 4/8/13, Seed Broadcast <http://blog.seedalliance.org/2013/04/08/purple-is-the-new-green-winter-sprouting-broccoli/>

## **2014**

- 3/5/14, Seed Broadcast <http://blog.seedalliance.org/2014/03/05/taste-panel-tests-cabbage-varieties-and-discusses-seed-needs-of-the-pnw/>
- 12/6/14, Edible Portland <http://edibleportland.com/a-better-tomato-a-better-tomorrow/>

## **2015**

- 4/3/15, OPB.fm, <http://www.opb.org/news/article/npr-plant-breeders-aim-to-save-northwest-from-bland-veggies/>
- 4/3/15, Northwest News Network <http://nwnewsnetwork.org/post/plant-breeders-aim-save-northwest-bland-veggies>
- 4/9/15, Seed Broadcast <http://blog.seedalliance.org/2015/04/09/expanding-spring-palates-through-participatory-breeding/>
- 4/13/15, Voice of America <http://www.voanews.com/content/plant-breeders-aim-to-save-diners-from-bland-veggies/2717061.html>
- 7/1/15, ATTRA Newsletter [https://attra.ncat.org/newsletter/weekly\\_harvest\\_070115.htm](https://attra.ncat.org/newsletter/weekly_harvest_070115.htm)
- 7/6/15, Seed Broadcast <http://blog.seedalliance.org/2015/07/06/new-purple-sprouting-broccoli-variety-trial-report/>
- 10/16/15, Seed Broadcast <http://blog.seedalliance.org/2015/10/16/osa-community-helps-evaluate-and-celebrate-fall-harvest/>
- 12/8/15, Seed Broadcast <http://blog.seedalliance.org/2015/12/08/new-2015-western-Washington-variety-trial-report/>

## **2016**

- 2/11/16, Heritage Radio Network <http://heritageradionetwork.org/podcast/bridging-the-gap-from-plant-breeders-to-eaters/>
- 2/22/16, SeedQuest [https://www.seedquest.com/news.php?type=news&id\\_article=73802&id\\_region=&id\\_category=&id\\_crop=](https://www.seedquest.com/news.php?type=news&id_article=73802&id_region=&id_category=&id_crop=)
- 3/10/16, Capital Press <http://www.capitalpress.com/20160310/seed-alliance-helps-develop-better-organic-varieties>
- 3/28/16, Seed Broadcast <http://blog.seedalliance.org/2016/03/28/purple-sprouting-broccoli-now-in-season/>

- 4/1/16, PCC Sound Consumer <http://www.pccnaturalmarkets.com/sc/1604/breeding-better-organic-produce-locally.html>
- 4/2/16, Good Food NW <http://www.goodstuffnw.com/2016/04/new-kid-on-block-purple-sprouting.html>

The long-term project goal was to expand year-round access to regionally grown vegetable crops in the NW supporting farmers, food industry and eaters in the region. This project facilitated expansion of a select number of crops and promoted regionally grown foods, but there are certainly many more crops that could additionally be expanded in the future through additional research and marketing efforts. The long-term success of these four crops may also be supported through additional research to refine production practices, address pest and disease issues, and continue to breed for improved traits for the region. The long-term market success of storage crops (onion and cabbage) may also depend on improved infrastructure for successful handling and holding of these crops in the winter.

The impacts of this project were assessed by conducting an online survey and through direct interviews and feedback from project participants including the farmers who hosted trials and event attendees (farmers, chefs, retailers). Participants were asked whether they have increased production of the four focus crops since 2012 and if so, then by what percentage. Of the respondents 58% reported an increase in cabbage production, 42% reported an increase in chicory production, 42% reported an increase in onion production, and 50% reported an increase in purple sprouted broccoli production. Interestingly, the lowest percent increase was in scale of cabbage production ranging from 15 to 75% increase while chicory and purple sprouted broccoli levels were 100-900% increase. The significant growth in production of these two crops is likely a reflection of the fact that these crops were much less common in 2012 and has significantly expanded in the market over the last 4 years. It is also promising that on average more than half of the growers surveyed have increased production in the four project focus crops indicating a significant increase in access to winter produce in the PNW. One farmer reported an increase in production of Purple Sprouted Broccoli from 2 to 20 beds representing a 10-fold increase. Another farmer commented, “chicories have proven to be a wonderful crop—extremely diverse, hardy and seasonal. (We are) trying out Purple Sprouting Broccoli for the first time this year, however it is hard to justify the lower return per square foot of broccoli and cabbage given the high risk of clubroot and black leg in the area, particularly overwintered.” This comment does point out that winter Brassica production in OR and WA can pose additional disease management risks particularly with the outbreak of Black leg (*Phoma lingam*) in 2014. Farmer’s feedback also included comments that there is a need for more organic cabbage and onion varieties bred for overwintering and storage qualities.

Project partners collaborated closely with Organically Grown Company (OGC) throughout the project period on breeding, variety trials and market introduction of purple sprouted broccoli. In 2016 OGC and OSA created a marketing flier to support retailers introducing the crop. OGC also expanded production with three growers in OR and sold over 1341 cases of the crop for the first time representing nearly \$38,000 in farm-gate value and higher for retail sales. OGC marketing staff were thrilled with the response from retailers and the high demand for the product. OGC also reported a 10% increase in onion sales and 15% in cabbage sales during the project period, but flat on chicory sales. The produce buyers report a steady demand for storage onions, but a lack of sufficient supply to fill the gap.

Overall the project goals of expanding production of the four crops were achieved as indicated by grower surveys and verbal feedback. Growth in purple sprouted broccoli and chicory sales are much higher in terms of percent growth than cabbage and onion reflecting the fact that these crops are newer to the market offering a greater potential for increase in production. The cabbage and onion market are much larger than the other two crops, so a modest increase potentially represents a more significant total increase in quantity and value. Lastly the positive reception of the food and farming press covering this topic is an indicator that this trend will continue into the future.

The original project goal was to result in increased production of winter cabbage, storage onions, overwintering sprouted broccoli and chicories. It was projected that at least 30 farmers would adopt or expand these crops or varieties during the project period. It was anticipated that this number would expand in the coming years as buyers (eaters) gain awareness of the superior qualities and local availability of these crops resulting in increased demand. It was also projected that the project would result in a 30% increase in sale of these four key winter crops by the end of the project period compared to a baseline of sales in 2012. Based on a survey of project participants farmers reported expanding production of all four crops more than 30%. Produce retailers however reported expanded sales of purple sprouted broccoli and chicory by more than 100%, but much less expansion of cabbage (15%) and onion sales (10%) according to a large distributor and less growth reported by smaller retail buyers.

## **BENEFICIARIES**

The primary beneficiary of this project is specialty organic produce growers in OR and WA. It is estimated that the project outreach activities reached at least 1500 target beneficiaries including farmers, chefs and retailers. This project additionally benefited eaters, particularly those seeking locally grown and organic food year around. Expanding production of these crops has the potential to expand income through critical off-season months when farmers traditionally experience low income and high expenses as they invest in inputs for the following season. This project also extended linkages in the food community among those who introduce new germplasm, to those who grow the crops, to those who prepare the food with the outcome of increased regional production, marketing and knowledge of specialty vegetable crops resulting in long term regional food production and economic security.

Sales of purple sprouted broccoli clearly made the greatest gain in economic impact based on market growth with OGC reporting an estimated \$38,000 farm gate value in their purchases alone in 2015. This crop was not part of their market in 2012. One retailer, the Food Coop, reported an increase of 277 of PSB valued at over \$1,000 retail value sourced from a single farm. The percent growth in cabbage and onions seems to be unclear with 10-15% growth reported by one source and flat sales from another. However these two crops represent a very large potential market where a modest increase may have a larger financial impact.

### **LESSONS LEARNED**

A strength of this project was engaging a large number of stakeholders in networking events in a social context which raised awareness and even created a buzz around the core project goals of increasing access to regionally grown produce year around and introducing new, regionally adapted crops. The social networking aspect also posed a minor challenge in tracking the true outcomes of the project as it is difficult to say how many new sales or production contracts were a direct result of the project versus the general trend in the local food movement. An interesting learning moment was the importance of engaging retailers and distributors in conversations about crop traits in addition to the farmers and chefs. Many prior variety-tasting events have focused more on the farmer-chef interaction and discussion about culinary qualities, which is valuable. However the retailers often asked different questions such as, “How long will it be available for? How would we present it on a market shelf? Will the buds hold up in a bulk bin?” These are different questions that demonstrate the need for a crop to fit the full chain of stakeholders to become a mainstay in the marketplace.

One thing this project did not do is exploring what other crops might also serve the winter market need. OSA also did not consider how these crops fit ergonomically into rotations or other potential impacts of increasing production of these four crops, such as the disease management of overwintering brassicas. It would be interesting to follow up this project with research that addresses the whole farm impact of winter production and explore additional crops that could expand year round access to produce in the Pacific Northwest.

The level of interest and participation from retail produce-industry participants stimulated conversations about which traits they prefer in the crops. This provided good feedback to the seed company and plant breeding participants and broadened their perspective of the importance of engaging this sector in breeding for a new crop or new market niche and facilitating market introduction of new varieties.

Tracking the contact information for all participants at the variety tasting/ networking sessions was difficult because many of these sessions were hosted at conferences or other events where participants were attending the broader event and chose to participate in the tasting event, but had not signed up for the tasting in advance. For this reason, it was a challenge to follow up with each individual participant to measure project impacts. OSA did reach out to the participants that could be tracked. Most of these contacts were from smaller events or those hosted at the OSA research farm where registration was in greater control. The responses from these participants in the impact assessment survey correspond well with the feedback from individual farmers, chefs and retailers that provided feedback in conversations.

This project was a two-state project combining funding and outcome objectives for the Oregon Department of Agriculture and Washington State Department of Agriculture Specialty Crops Grants. Support from the two states was beneficial as it did allow broader outreach to achieve impacts by working with stakeholders across both states and developing complimentary activities prioritized by each agency’s program. Coordinating project activities and budgets across two separate sources of funding was also a challenge at some points and good clarity and coordination of activities and budgets is recommended.

### **ADDITIONAL INFORMATION**

A total of \$21,200 in matching funds were contributed as in-kind donations of OSA staff time and financial contributions from Organically Grown Company as originally proposed in the project budget: \$9,000 Funds for purple sprouted broccoli variety development from Organically Grown Company (\$3,000/yr). \$13,200 Partial salary and fringe for Micaela Colley, PI, to lead in development of a NW variety improvement collaborative, developing network of

stakeholders for project events and facilitating new production/marketing activities (\$3,960). Kristina Hubbard, OSA Communications Director to lead in project promotion and communications (\$6,600). Cathleen McCluskey, OSA outreach associate to design, layout, and publish report of project results for public outreach \$2,640 total.

Additional in-kind services were provided by Organically Grown Company for support of on-farm field trials of purple sprouted broccoli; hosting a variety tasting at the OGC headquarters, and co-developing and distributing a marketing flier to promote the crop introduction into retail sales, valued at \$5,000.

The publication of results from the on-farm trials, Vegetable Crops for Season Extension in the Pacific Northwest: Variety trial results 2014-2016, is available on the OSA website at:

[http://seedalliance.org/index.php?mact=DocumentStore,cntnt01,download\\_form,0&cntnt01pid=54&cntnt01returnid=129](http://seedalliance.org/index.php?mact=DocumentStore,cntnt01,download_form,0&cntnt01pid=54&cntnt01returnid=129)

#### **CONTACT INFORMATION**

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**Project Title:** Market development and production research for the Cider/Perry Industry.

**Partner Organization:** Northwest Cider Association (NWCA)

### **PROJECT SUMMARY**

Washington is the largest producer of apples in the U.S. (156,000 acres) and accounted for 48% of the U.S. supply in 2011 (U.S. Department of Agriculture, 2014), and has the potential to become the leading cider apple producing state. Cider (0.5% to 8.5% alcohol by volume) remains the fastest growing alcohol market segment in the U.S., and the volume of cider produced in Washington State grew by over 17-fold between 2007 and 2014, from 44,387 to 759,282 gallons, a 48% growth rate per year. This project addressed constraints to the expansion of the cider industry in Washington, i.e., lack of significant quantities of affordable cider apples, effective management options for apple anthracnose canker in western Washington, and post-harvest quality of machine harvested cider apples.

The number of cideries in Washington increased from 4 in 2008 to 59 in 2015, a 15-fold increase, and accounts for 9% of the cideries currently in the U.S. (Brown, 2014; Miles and Peck, 2014; Northwest Cider Association, 2014; U.S. Association of Cider Makers, 2016). However, since the only use of specialized cider apple cultivars is for making cider, growers need reliable information regarding orchard management systems and impact of harvest methods on juice and cider characteristics before planting significant acreages.

Project K 741 (2011-2013) provided basic information to a cider industry in need of supporting research to continue its development. The current project K 1270 expanded the range of information available to growers and cider makers, particularly in the areas of variety selection and mechanical harvest.

### **PROJECT APPROACH**

**Varietal evaluation:** During the project period the WSU team harvested, pressed, and collected juice samples from 70 cider apple varieties. Juice samples were analyzed for tannins (%), oBrix, pH, specific gravity (SG), and malic acid (g.L-1). The cider variety orchard was maintained (pruned, weeded, and fertilized). Full bloom date and bloom abundance were recorded in April and May. Trees were rated for productivity (except 2015) as well as recording the actual weight of fruit at harvest for each variety. Additionally, a new replicated research orchard planted 2014-2016 was maintained, trees surveyed for anthracnose infection, and treated with insecticide for an infestation of leafhoppers. The new orchard planting was completed in February 2016 (planting was split into two phases due to a shortage of rootstocks in 2013). Results were recorded and summarized in presentations at state and national meetings (Appendix: Presentations). A listing of nurseries specializing in cider apple varieties was updated. Varietal evaluation data is complete through 2015 and a publication has been drafted in 2016.

**Machine harvesting:** On September 29 2015 and 2016 a machine harvest trial was conducted using a Littau over-the-row mechanical small fruit harvester designed for raspberry harvest. The cultivar was 'Brown Snout' in a closely spaced trellis planting on strongly dwarfing rootstock. The goal was to compare the time and labor needed for hand harvest vs. machine harvest. Juice analysis was done of fruit pressed immediately at harvest, and after storage of 2 and 4 weeks, respectively, to determine the effects, if any, on storage of machine harvested fruit (which suffers considerable bruising in the harvest process) compared to hand harvested fruit. The data for 2015 and 2016 were analyzed and compared, and a journal article has been published (see Appendix). C. Miles and T. Alexander attended CiderCon 2016 in Portland, OR February 2-5, 2016 and gave presentations on machine harvesting at the Advanced Orchard Workshop on February 3. They also attended and gave presentations at the American Society for Horticultural Science (ASHS) Annual Conference in Atlanta, GA, August 8, 2016.

**Production cost models:** An enterprise budget for cider apple production in central Washington has been published as an extension bulletin (see Appendix). The assumptions and key results of the enterprise budget for western Washington serves as the baseline for a partial budget analysis on the costs and benefits of mechanical harvest, and this Extension publication is in press. S. Galinato attended CiderCon 2016 in Portland, OR February 2-5, 2016 and gave a presentation on production costs at the Advanced Orchard Workshop on February 3.

**Review and compile research about anthracnose of cider apples in marine climates:** Apple anthracnose canker is caused by the fungus *Neofabraea malicorticis* and is the primary disease impacting apple production in western Washington. Since anthracnose canker does not occur in eastern Washington, there is limited information regarding management of this disease in Washington. A literature search was conducted and information regarding control and management of this disease was compiled, and the webpage <http://treefruit.wsu.edu/crop-protection/disease-management/apple-anthracnose/> was updated with this new information. The cider orchard at NWREC was managed in accordance with this new information, and experiments have been designed to test methods to control apple

anthracnose cankers. W. Garton gave a presentation on management of apple anthracnose canker at the Advanced Orchard Workshop on February 3 at CiderCon 2016 in Portland, OR February 2-5, 2016, at the American Phytopathological Society Division meeting in LaConner, WA, on June 29, 2016, and at the American Society for Horticultural Science (ASHS) Annual Conference in Atlanta, GA, August 8, 2016.

The WSU team is a significant partner on this project. They have collected all data outlined under the Research Project Activity workplan and have analyzed data and published final results. Preliminary findings have been published in reports and presented at workshops and conferences in Washington and nationally. C. Miles attended CiderCon 2014 and 2015 in Chicago, IL, and the entire cider team attended CiderCon 2016 in Portland, OR February 2-5, 2016. Miles, Garton, and Alexander gave presentations at the CiderCon Advanced Orchard Workshop on February 3, 2016 and also gave poster session presentations at CiderCon and at ASHS.

This project does not benefit non-specialty crops.

### **GOALS AND OUTCOMES ACHIEVED**

**2014-2015:** The established cider research orchard was maintained, and a new replicated cider research orchard was planted April 4, 2014, which included 58 varieties previously established and 6 recommended varieties not previously evaluated. Full bloom date and bloom abundance was recorded for all varieties. Harvest of the cider variety trial was completed by November 10, 2014; the machine harvest trial was conducted on October 16, 2014. Harvested fruit was stored briefly and pressed within 4-7 days of harvest for each variety. Fruit samples were chopped in a shredder (MuliMax 30, Zambelli Enotech, Camisano Vicentino, Italy) and pressed in a bladder press (40 liter Enotecnica Pillan, Camisano Vicentino, Italy). Juice samples were collected in 500 ml plastic bottles at the time of pressing and frozen (5oF; -15oC) until harvest of all varieties was completed. Pressing of all samples was completed by November 18, 2014. Juice samples were thawed to 68oF (20oC) and analyzed for tannins (%), oBrix, pH, and malic acid (g.L-1). Juice analysis was completed by December 12, 2014, and data entered and analyzed. Preliminary results were presented at the national CiderCon (Chicago, IL), February 2015. Orchard maintenance was performed in the cider test block and in the new orchard.

**2015-2016:** Harvest of the cider variety trial was completed by October 26, 2015; the machine harvest trial was conducted on September 29, 2015. Juice was pressed by November 2, 2015 and analyzed following the same procedures as in 2014-2015. Juice of 12 selected varieties were fermented as single varietal ciders, bottled, and stored for future sensory evaluation. Planting of the new cider research orchard, consisting of 2 replications, 3 trees each, of 65 different varieties, was completed with the addition of trees to fill in all replications. Regular orchard maintenance, e.g. pruning, spraying, etc. was performed in both established and new cider research orchards. An Extension publication on the costs and benefits of mechanical harvest is in press. S. Galinato attended CiderCon 2016 in Portland, OR February 2-5, 2016 and gave a presentation on production costs at the Advanced Orchard Workshop on February 3. A literature search was conducted and information regarding control and management of apple anthracnose canker was compiled, and the information was updated on the web page <http://treefruit.wsu.edu/crop-protection/disease-management/apple-anthrachnose/>. Results of this project were presented at CiderCON, the national meeting of cider makers, orchardists, and researchers held in Portland, OR, February 2-5, 2016, at the Advanced Orchard Workshop (February 3) and at poster sessions February 4-5. Approximately 200 participants at the Orchard Workshop, and 1,200 at the conference. In addition, a production cost model was completed to present at cider workshops. Presentations on mechanical harvest and apple anthracnose canker were given at the American Society for Horticultural Science Annual Conference. Atlanta, GA, August 8-11, 2016.

The long-term goal of increasing the Washington market share for cider apples (target: by 2033 there will be at least 40 cider orchards in the region, encompassing 400 acres) is still to be met. According to Statista Research and Analysis, as of September 2016 there were a total of 53 cider producers operating in Washington (<https://www.statista.com/statistics/300851/us-number-of-cider-manufacturers-by-state/>). There were an estimated 204 acres of cider apples produced in Washington State in 2010 and 256 acres in 2011 (Northwest Agriculture Business Center informal survey 2013).

GOAL	TARGET	BENCHMARK	RESULT	NOTE	MEASURE
New cider apple/pear producers	25	current	25+	(1)	Survey of orchardists and nurseries providing seedlings
New planting of cider varieties	100 acres	current	100+	(1)	Survey of orchardists and nurseries providing seedlings
New NWCA cider makers	10 new members	Currently 31	63 current members 32 increase	(2)	NWCA records
Domestic cider sales	50% increase	17 million gals	56 million gallons	(3)	U.S. TTB data
Varietal evaluations	2 years data	30 varieties	30+	(4)	Publication
Mechanical harvest	Implementation	2 orchards adopting	0	(5)	Survey orchardists
<b>NOTES:</b> (1) Definitive survey data not available at time of report. Preliminary reports from WSU scion wood sales and reports from nurseries indicate a considerably higher number of producers and total acreage of cider apple varieties. A single orchard in Washington planted 50 acres. (2) October 2016 membership in Washington, Oregon, Idaho, and Montana (3) 2015 data, 2016 data not available (4) See publication list (5) No orchards have adopted, but orchard establishment has not been reached. Confident orchards will begin adopt mechanical harvest within 3-5 years.					

All research data has been analyzed and two publications are complete, two are in press, and one is in preparation. The number of cideries and acreage of cider apples have increased over the course of this project.

## **BENEFICIARIES**

Cider apple growers and cider makers have benefited from the information resulting from this project, as well as the support industries that serve cider production, and the staff employed at cideries and orchards.

*Variety evaluation:* Data collected on bloom date and bloom density help growers to select varieties that bloom together to assure cross pollination; data collected on productivity and harvest date help to estimate the potential yield of each specific variety, to time the harvest, and to select varieties with more reliable fruit production. Juice analysis helps growers and cider makers to select varieties with a desired mix of juice characteristics for their cider fermentations.

*Mechanical harvest:* Data collected on juice quality and the time per person to harvest each plot (machine vs. hand harvested plots), efficiency of fruit picking (ground falls, machine/hand harvest, post- machine cleanup), juice analysis of post-harvest storage fruit, and damage to fruit and trees are all significant in the consideration of growers to adopt a form of machine harvest for cider apples.

*Production cost models:* Information incorporated in the production cost models allows current and potential growers to assess the viability and potential success of cider orchard plantings involving different variables of orchard design and management.

## **LESSONS LEARNED**

Project staff improved the timing of optimum fruit harvest for each cultivar in the variety trial by tracking the weekly field observations of soluble solids and other ripeness criteria (e.g. seed color, skin color, fruit drop) and recording them for comparison to establish full ripeness. This was critical to harvest timing in 2015 and 2016 because climate conditions at harvest both years were not typical of previous years.

Positive results of the project include: 1.) the completion of an extension bulletin on production costs for cider apple orchards in central Washington, 2.) a partial budget for machine harvest compared to hand harvest with Extension publication in press, 3.) update of web page <http://treefruit.wsu.edu/crop-protection/disease-management/apple->

[anthracnose/](#), 4.) collection of data for the ongoing evaluation of specific cultivars for hard cider production, including the fermentation of selected ciders and evaluation of varietal ciders, and 5.) publication of mechanical harvest paper.

Negative results were the problems, budgetary and logistical, associated with obtaining a mechanical harvester more appropriately designed for tree fruit to test for cider apple harvest.

In the new replicated cider research orchard, anthracnose cankers were observed in the young trees that potentially damaged their growth. Multiple anthracnose cankers were also observed in the established cider apple research orchard. The presence of new anthracnose cankers was an ongoing serious problem and research is needed to develop effective management options.

A new mechanical harvester to test in the research orchard was not secured. The Littau mechanical harvester belonging to the station which had been used in previous mechanical harvest trials to complete the mechanical trials was utilized. Adoption of mechanical harvest appears unlikely without significant additional information. Information gaps include long term potential impacts of mechanical harvest on tree health and productivity. Additionally, lack of suitable, available equipment, and high capital investment cost of equipment are primary factors limiting adoption, especially when equipment has not been tested on cider apples.

#### **ADDITIONAL INFORMATION**

<b>MATCH</b>		
<b>Item</b>	<b>Budget</b>	<b>Actual</b>
SBS Imports cash donation	\$3,000	\$3,000
Fruit Smart	\$3,500	\$3,500
NWCA Board meetings	\$21,000	\$28,245
SBS In-kind	\$8,000	\$8,000
WSU In-kind	\$24,287	\$18,000
WSU Bio-ag	\$7,500	\$7,500
<b>Total</b>	<b>\$67,287</b>	

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- Miles, C. and W. Garton. 2016. Managing Pests and Diseases in Cider Orchards: Special Considerations for the Pacific Coast. Advanced Cider Orchard Production Workshop, CiderCON 2016, Portland, OR, 3 February.
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## **CONTACT INFORMATION**

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**Project Title:** Control of Spotted Wing Drosophila and the Asian Blueberry Markets

**Partner Organization:** Whatcom Farm Friends

### **PROJECT SUMMARY**

Blueberries have become Washington State's most rapidly growing commodity. With 7,000 acres of full bearing blueberries in production and an additional 4,000 acres of non-bearing to not yet fully bearing plantings, it is critical that Washington State not only keeps its current market share but expands it as rapidly as possible. Washington State's proximity to established markets in the Pacific Rim provides an excellent opportunity to increase export sales in Asia. Unfortunately, the recent incursion of a small insect into Washington State has severely jeopardized the ability of farmers to market blueberries into this new market. The spotted wing drosophila (SWD), which is the first insect to directly attack the fruit, does so just prior to harvest. At this critical time, the blueberry industry is lacking adequate tools to deal with this new threat. Chemical treatments to fight SWD do not have adequate MRLs necessary to ship fruit to Canada, South Korea, Japan, the EU and Taiwan while maintaining insect control.

In 2012, Washington as well as California and Oregon had fresh blueberries rejected from Pacific Rim countries due to SWD control efforts that resulted in MRLs over the acceptable limit. As a result of these events, USDA APHIS has told the blueberry industry that countries that did not have detections in 2012 would increase their scrutiny of blueberries in 2013. Countries that did have detections over violative MRLs in fresh blueberries expanded surveillance to include processed blueberries.

The goals of this project were to: 1) conduct field research to generate residue decline curves which will allow the blueberry industry to develop more effective pesticide use patterns using currently registered products to control SWD without violating MRLs and 2) fund field trials to generate efficacy data for new products for control of SWD. This included separate trials for organic blueberries. Organic blueberries have an especially large challenge with SWD control as they have a single product, spinosad (Entrust) and the over reliance on a single product threatens to result in levels that could exceed established MRLs.

The primary goal for this project was to generate pesticide residue data so that degradation curves could be generated that would allow growers to make informed decisions on how to meet MRL (maximum residue levels) for various pesticides required to grow blueberries for export markets. It was estimated that two years of data was needed to complete this project. The project was outlined in the fall of 2013 and data was generated in the 2014 and 2015 growing seasons. Data was disseminated at the 2014 and 2015 Washington Small Fruit Conference held in Lynden each December. A set of recommendations for the Washington blueberry industry on how to meet foreign MRLs based on the results of this project was completed in the spring of 2016.

This project was not built on a previous SCBGP project.

### **PROJECT APPROACH**

Field trials were set up in the three major growing regions of Washington for a three year period. These projects were coordinated with scientists in Oregon and Michigan so that results could be compared with those states. At regular intervals the samples were collected (seven times per location) and shipped to a pesticide analytical lab and the residues were analyzed. Each year a summary report was prepared for the five locations. At the end of the three year period a final report was prepared and distributed to the industry. The reports included residue decline curves for each insecticide for each location. The final report included a summary residue decline curve that was the combination of all of the data from all of the locations and it provided recommendations to the blueberry industry on how to apply insecticides in a manner that would allow export to specific markets. In some cases the report recommended some pesticides to not be used by growers if the blueberries were destined to certain markets. The insecticides used in the trial were malathion, methomyl (Lannate) imidacloprid, spinosad (Entrust) and zeta cypermethrin (Mustang Max), phosmet (Imidan), carbaryl, thiamethoxam (Actara) and spinetoram (Radiant). The markets that were considered included Canada, Japan, Korea, Hong Kong, Taiwan and Australia. Although there were six countries prioritized, the results could be applied to any country's MRLs.

Alan Schreiber, Lynell Tanigoshi and Steve Midboe conducted field trials in Franklin, Skagit and Whatcom counties, respectively. Samples were shipped to the Synergistic Pesticide Laboratory for analysis. These results were provided to Dr. Schreiber and Oregon State University's Joe DeFrancesco. Camille Holladay of Synergistic Pesticide Laboratory and Alan Schreiber developed a final report for the industry including how to meet MRLs with the generated data. No other commodities but blueberries will benefit from this project.

## **GOALS AND OUTCOMES ACHIEVED**

<b>Project Activity</b>	<b>Responsible Party</b>	<b>Timeline</b>	<b>Progress</b>	<b>Status</b>
Contracts prepared with all project contributors	Henry Bierlink	October 2013	Contracts are signed	complete
Conduct telephone interviews to assess tonnage that sustained rejections due to MRLs for use as baseline information in evaluating project	Alan Schreiber Henry Bierlink	November 2013	Interviews Conducted	complete
Continue tonnage information collection	Alan Schreiber Henry Bierlink	12/5-6/2013	Finished phone interviews	complete
Conduct field trials that generate residue decline curves for the leading 10 active ingredients in three locations: Skagit, Whatcom and Franklin counties	Alan Schreiber Lynell Tanigoshi Steve Midboe	During growing seasons of '14 and '15	Field trials set up First evaluation was completed Second evaluation completed	2014 field work completed, 2015 field work completed.
Data would be disseminated at annual meeting for growers' benefit.	Henry Bierlink, Alan Schreiber, Lynell Tanigoshi	Winter 2013-2014	First mtg on October 22, annual grower meeting on Dec 5 <sup>th</sup>	complete
Reports documenting the accumulated data from 2 yr. given at annual meeting	Alan Schreiber, Lynell Tanigoshi	Winter 2014-2015	First mtg on October 22, annual grower meeting on Dec 5 <sup>th</sup>	2014 and 2015 Reporting complete
Final reports disseminated at annual meeting	Bierlink, Schreiber	Winter 2015-2016	December Small Fruit Conference in 2014 and 2015 featured a report on the project.	completed
Submit reports to WSDA	Bierlink, Schreiber	Quarterly, Annual, Final	Quarterly and Annual reports are submitted.	Ongoing, final report submitted

The report does not include long term outcomes other than exports are expected to increase over time as a result of this project and other factors.

On December 1st there was a report given to the Washington blueberry industry describing important issues from 2015. Imports for 2016 will not be available until a little under a year from now. Blueberry exports appear to be increasing but it is too soon to calculate how much has occurred since the conclusion of this trial.

As a result of this project, Washington blueberry exports now have tools that allow them to “deal” with a large number of blueberry MRLs that formerly were trade impediments. Growers can use insecticides that they previously were not able to use in certain export markets.

## **BENEFICIARIES**

The beneficiaries of this project include growers raising blueberries for the export market, handlers who export blueberries, exporters who ship the fruit and those entities that receive Washington exported blueberries.

It is too soon to quantify the economic impact of this project. Overwhelmingly, Washington exports processed blueberries, most frozen, but also dried, concentrate and some pureed products. The 2015 crop has and is being shipped. The 2016 crop is still in storage and a significant amount has not been processed and or packaged.

## **LESSONS LEARNED**

WA Blueberry growers benefited through the cooperation with Oregon and Michigan. Growers are very, very appreciative of this project and the data that were generated from it. For growers active in the export market this project is like gaining several new insecticide registrations. One problem discovered during this project is that some MRLs for some countries are so low that the growers cannot possibly meet them and growers need to work with the registrants of those products and the individual companies to work with those countries to try and get those MRLs raised. This project could only address about half of the insecticide MRL obstacles the industry faces.

There weren't any unexpected outcomes or results that affected the project.

All goals were achieved except quantifying the beneficial outcomes and not enough time has passed to quantify those benefits.

#### **ADDITIONAL INFORMATION**

Farmers provided \$32,000 in in-kind match by cooperating with Research on their farms. The WBC invested \$77,000 in cash to advance the research project.

<b>COST CATEGORY</b>	<b>Grant Funds</b>	<b>Invoiced to Date</b>	<b>Balance</b>	<b>Total Project Cost</b>
Salaries	\$3,210	\$3,127.50	\$82.50	\$3,210
Benefits	\$481	\$469.13	\$11.87	\$481
Contractual	\$96,309	\$96,403.37	-\$94.37	\$96,309
<b>TOTAL</b>	<b>\$100,000</b>	<b>\$100,000</b>	<b>\$0.00</b>	<b>\$100,000</b>

#### **CONTACT INFORMATION**

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**Project Title:** Mechanizing red raspberry pruning and cane tying

**Partner Organization:** Washington Red Raspberry Commission (WRRC)

### **PROJECT SUMMARY**

Cane management in red raspberry production is highly labor intensive. Labor availability is uncertain at best and labor cost is increasing. Currently, Washington growers estimate the pruning and tying (Fig. 1) cost in red-raspberry production to be from \$600 to \$800 per acre. In addition, labor is at risk for chronic and acute injury. Mechanization has the potential to substantially reduce labor use from cane management. In this project, WRRC contracted with WSU to develop a systematic approach for cane management through horticultural modifications and engineering solutions. New horticultural systems for physically separating one-year and two-year old canes were investigated. These systems were evaluated for their feasibility to allow mechanized pruning of two-year old canes while maintaining the desired level of yield. In addition, techniques were developed to bundle one-year old canes together and tie them to the trellis wires. WSU expects that the successful completion of the project will lead to a practical cane management system. In the long term, commercial adoption of the system will improve economic sustainability of WA red raspberry production. The system will also have potential to be adapted to other WA specialty crops such as black raspberry and blackberry.



**Fig. 1: New (year-1) canes bundled together after old (year-2) canes have been pruned.**

This project impacts all red raspberry growers in WA who use the florican production system - the entire industry relies on manual labor to prune and tie canes. This combined operation represents about 35% of the total variable costs of production (MacConnell and Kansiger, 2007). The project generated industry-applicable techniques to improve labor productivity and reduce labor demand. The project's main emphasis was in researching and developing technologies to mechanize or automate training and pruning operations. Success in this objective will lead to a machine that can dramatically reduce labor demand and costs, amounting to as much as \$300 to \$500 per acre per year for combined pruning and cane tying. These savings will lead to millions of dollars of economic benefit to the \$30+ million dollar per year WA red raspberry industry, which will substantially improve the competitiveness and long-term sustainability of the industry. Farmers were expected to see the benefit from engineering solutions within four to five years of this funding.

This project addressed the “*Preserving Key Resources – Labor, [Land, or Water]*” priority by developing horticultural and mechanization technologies for reducing labor requirements for red raspberry production. Increased mechanization will create higher skilled jobs (with higher pay) in a safer work environment. In addition, mechanization will reduce direct involvement of humans in fruit production, which has a potential for “*Improving Food Safety.*”

The project was not built on a previously funded SCBGP project.

### **PROJECT APPROACH**

#### **Horticultural Study:**

Test red raspberry plots were planted in the beginning of this project and have been maintained following commercial practices in field operations including irrigation, nutrient application and cultivation. A red raspberry plot established and maintained at WSU Prosser (Fig. 2) included several red-raspberry varieties, which provided a test ground for

various engineering and horticultural studies in eastern WA thus avoiding the need for frequently travel to western Washington for prototype evaluation.



**Fig. 2: Red raspberry plot established at Washington State University's research farm, Prosser, WA**

In collaboration with WSU weed scientist Dr. Tim Miller, yield data was collected weekly in 2015 by variety based on different cane burning chemistries (Table 1). It was found that three varieties tested had significantly different acidity (TA, titratable acidity) following the cane burning which was highest in the variety Wakefield (2.06% acidity).

**Table 1: Cane Burning Fruit Quality by Cultivar (2015 Harvest Season).** Bri is a measure of sweetness (soluble solids), TA is titratable acidity which, along with pH measures fruit acidity, anthocyanin measure fruit color, with higher numbers indicating darker fruit, and phenolics are an indicator of fruit antioxidants.

Cultivar	Brix	TA	pH	Anthocyanin	Phenolics
		%		mg/g	au/g
Chemainus	12.35 <sup>b</sup>	1.85 <sup>b</sup>	3.6 <sup>a</sup>	0.57 <sup>b</sup>	1.67 <sup>b</sup>
Meeker	14.09 <sup>a</sup>	1.59 <sup>c</sup>	3.6 <sup>a</sup>	0.56 <sup>b</sup>	1.95 <sup>a</sup>
Wakefield	13.46 <sup>a</sup>	2.06 <sup>a</sup>	3.4 <sup>b</sup>	0.64 <sup>a</sup>	1.93 <sup>a</sup>

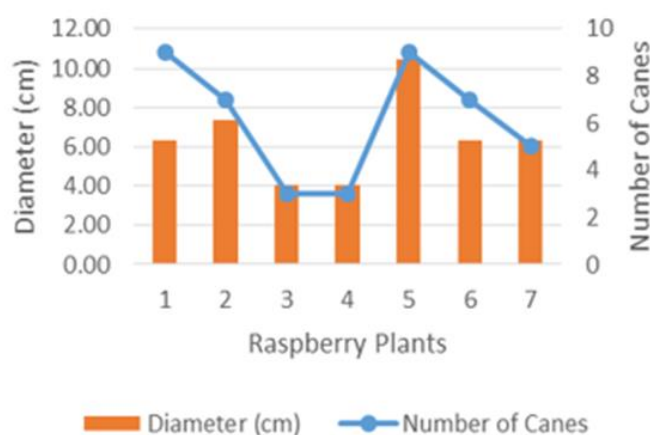
*\*Different letters following the numbers in a column represent a statistically significant difference between varieties for the given quality measure*

Cane weight was measured in June, 2016 across the three varieties (Table 2). Biomass of primocane and fruiting lateral differed by cultivar but not by herbicide treatment, while floricanes biomass did not differ by either cultivar or herbicide treatment. These results indicate that the herbicide treatments had neither a negative nor positive effect on plant growth.

**Table 2: Weight of cane and laterals**

<b>Primocanes (g)</b>			
Wakefield	39.4 <sup>a</sup>	Aim once	31.6
Chemainus	32.4 <sup>ab</sup>	Aim twice	35.5
Meeker	30.9 <sup>b</sup>	Treevix	30.3
		Nontreated	39.5
<b>Floricanes (g)</b>			
Wakefield	43.8	Aim once	34.7
Chemainus	38.1	Aim twice	36.8
Meeker	36.4	Treevix	38.3
		Nontreated	47.9
<b>Laterals (g)</b>			
Wakefield	76.9 <sup>a</sup>	Aim once	47.6
Chemainus	29.6 <sup>b</sup>	Aim twice	47.7
Meeker	29.6 <sup>b</sup>	Treevix	39.8
		Nontreated	45.9

Plant size (diameter around the canes in a plant) is an important parameter for optimizing the design of a bundling and tying mechanism. In the winter 2015, the diameter of plants was measured after floricanes were pruned out (Fig. 3). In the two years old test plot established for this project, the plant diameter varying from 4 to 11 cm.



**Fig. 3. Samples of bundle diameters for different numbers of red raspberry canes.**

#### **Engineering Study:**

Novel mechanisms were designed and fabricated to work in field conditions in trellised red-raspberry production system for cane bundling and tying. Innovative methods were also developed for floricanes detection. Details on these activities and results will be discussed below.

**Cane Bundling:** A hydraulically controlled cane gripping mechanism was designed, fabricated and evaluated in a red-raspberry plot. This mechanism has been designed with L-shaped arm whose closing action, controlled by chain and sprocket, brings scattered canes together as a bundle. A metal rod was added in front of the sprockets to prevent the canes moving into the sprockets and getting damaged. This mechanism was mounted on the three-point hitch of a John Deere tractor (Fig. 4) and controlled by the tractor hydraulics for field evaluation. Field evaluation in a test plot in Prosser, WA showed 97% bundling success (Table 3). As the plant was still young, there were only 5 to 10 canes in each plant after pruning.



**Fig. 4: Field evaluation of a cane bundling mechanism**

Table 3. Results of bundling mechanism test

S. No.	Number of Canes	Number of samples	Total number of canes missed	Average Bundle Diameter(cm)
1	4	5	0	5.0
2	5	8	2	5.6
3	6	3	1	7.6
4	7	4	0	7.3
Mean				6.1

**Cane Tying:** A circular gear-teeth end-effector was designed to wrap an adhesive tape around bundled canes (Fig. 5). Canes enter into the wrapper through an opening in the wrapper. The circular wrapper was motorized using a stepper motor connected on the top of one of the vertical shafts. A half-scale prototype was fabricated using a 3D printer. The tape tying end-effector prototype was evaluated in the field along with the bundling mechanism discussed before. The prototype accommodated cane bundles with a maximum of 7 canes. After this field test, the tying mechanism has been improved by adding a rack and pinion-based arm, which can cut the tape as well as grab and hold the tape for next plant to be bundled. With this mechanism, the tape wrapper goes around the bundled raspberry canes for several rounds (currently programmed for three rounds but no. of rounds can be adjusted as needed). Once the switch is on, wrapper will go around the bundled canes. Tape is released from the grabbing end during the first round of the wrapper. During the final round of the wrapper, the forward movement of the motor will extend rack, letting the tape pass between the cutting blade and the grabbing end. When the tape wrapper stops completely, the extended arm will close, cutting the tape from the end near the plant while the other end of the tape is being pulled and held by the cutter for next round of wrapping. The improved prototype was also fabricated using a 3D printer and was evaluated in the laboratory environment earlier this fall (Fall 2016).

Some features of this mechanism include:

- *This newly added tape cutting and grabbing mechanism is fully automated and is controlled by a single dc motor.*
- *The tape wrapper design has been improved by adding supports for guiding the tape for grabbing and cutting mechanism. Opening in the new tape wrapper has been increased to let up-to nine canes enter inside it.*
- *Special attention has been given to synchronize the movement of wrapping and cutting mechanisms.*



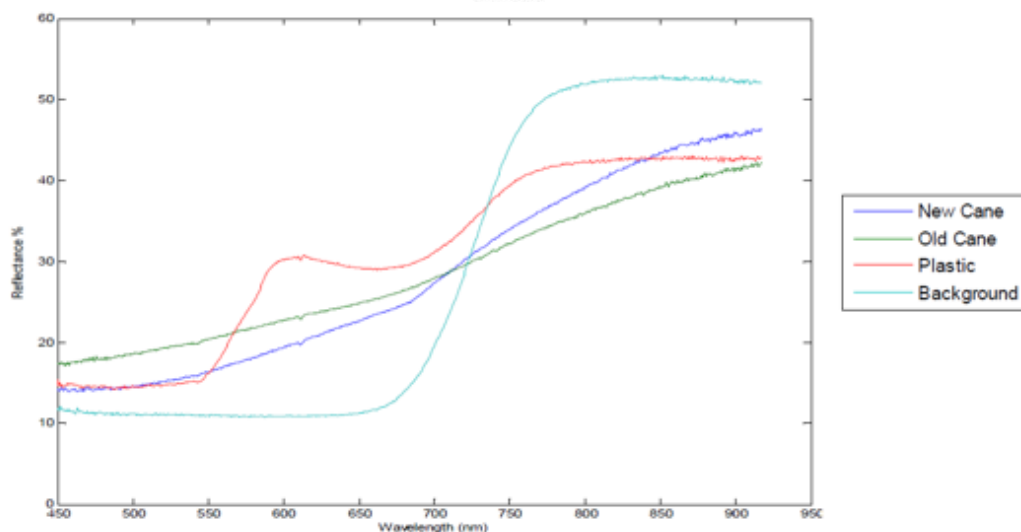
**Fig. 5: A mechanism to tie adhesive tape around a bundle of canes; Left - Earlier version of the prototype being evaluated along with a bundling mechanism. Right – Improved version of the mechanism being evaluated in the lab.**

**Automated Detection of Floricanes:** Automated pruning requires a sensing system for automated detection of Floricanes (two year old canes). During pruning season, it is not always easy to distinguish Floricanes and Primocanes (one year old canes). In this work, a hyperspectral camera was used to estimate spectral signature of different types of canes (Fig. 6). The hyperspectral imaging system used was a line scanner Hyperspec® VNIR 1003A-10143, with a spectral range of 350nm to 1006nm, divided into 881 channels with 0.72 nm interval between channels. Hyperspectral images of primocanes and floricanes were obtained in laboratory environment. The spectral signature for primocanes and floricanes showed some differences (Fig. 7), which was utilized in automatically detecting floricanes in the complex scene of primocanes, floricanes, and background surfaces such as ground and sky. K-means classification algorithm was used to detect floricanes using the spectral signatures, which resulted in an accuracy of 85%.

Feasibility of another approach of using color painting of canes during bundling was also explored. Food grade colors were used to paint floricanes in June, 2015 and were evaluated qualitatively over several months. Out of different colors painted, orange showed more promise for longevity and prominence compared to yellow, blue, or white.



**Fig. 6: Enclosed laboratory setup - hyperspectral camera with a pan-tilt unit for taking images of red raspberry canes.**



**Fig. 7: Spectrum of new canes (dark blue), old canes (green), plastic tie (red), and background cloth (light blue) as observed from hyperspectral scanner.**

**Robotic Pruning:** A robotic end-effector or a hand was designed and fabricated using a scissor mechanism (Fig. 8). The end-effector was then integrated with a robotic manipulator or arm and was automatically controlled to achieve a pruning cut in the laboratory environment.



**Fig. 8: A manipulator and a pruning end-effector in lab testing**

WSU's Center for Precision and Automated Agricultural Systems and USDA/ARS conducted the research into establishing a red raspberry plot in WSU Prosser and development of a mechanical cane bundling and tying techniques as well as a machine vision system for facilitating automated pruning. The details on these activities are described in the Project Summary and Goals and Outcomes Achieved sections of this report.

This project does not benefit non-specialty crops.

### **GOALS AND OUTCOMES ACHIEVED**

The long term goal is to lower the cost of production across the entire WA industry that produces frozen red raspberries. Specifically, the target is to develop mechanization and automation solutions to reduce labor costs in pruning and cane tying by up to 30 to 50%, which currently stands at an estimated \$600 to \$800 per acre. Through design, fabrication and evaluation of machine prototypes, significant progress has been made in this project towards developing mechanized or automated cane tying machines. Progress has also been made in various components of automated pruning including detection of floricanes for pruning, and integration and evaluation of an end-effector (a cutting scissor) and a robotic manipulator (or arm) for cane cutting. Further research in improving the cane detection method and maneuvering of robotic hand to desired canes for pruning is essential for moving the technology forward to achieve the stated long term goals.

<b>Proposed Activity/Goals</b>	<b>Actual Accomplishment</b>	<b>Status</b>
Planting and management of red raspberry plot	<ul style="list-style-type: none"> <li>A red raspberry plot was planted in Prosser, WA in 2014 and maintained using commercial practices.</li> <li>Weed control and cane burning have been completed every season</li> <li>The irrigation system was improved and row end drip/puddling has been eliminated.</li> </ul>	Planting and management goal achieved;  Alternate year planting was not pursued as discussed in Lessons Learned portion of report
Collection of plant growth and productivity data	<ul style="list-style-type: none"> <li>During 2015 harvest season, yield data was collected weekly by variety based on different cane burning chemistries.</li> <li>Weight of canes and laterals were also measured.</li> </ul>	Achieved
Collection of pruning-related data	<ul style="list-style-type: none"> <li>Plant size was measured after pruning as a parameter for bundling and tying mechanism design.</li> </ul>	Achieved
Analyzing field data	<ul style="list-style-type: none"> <li>Fruit from each harvest was composited by burn down material, for a single season fruit quality analysis for Brix, TA, and fruit color.</li> </ul>	Achieved

Design cane bundling and tying machine	<ul style="list-style-type: none"> <li>• Several alternative designs for cane bundling were conceptualized.</li> <li>• Three conceptual designs were created for tying mechanism.</li> <li>• 3D computer models of tying mechanisms were developed.</li> <li>• A few raspberry fields were visited in Lynden, WA in 2013 and 2015 to learn more about floricanes growth, which helped optimize the designs.</li> </ul>	Achieved
Develop and evaluate bundling and tying mechanism	<ul style="list-style-type: none"> <li>• Two to three versions of bundling and tape tying prototypes were fabricated.</li> <li>• Prototypes were first evaluated in the lab, improved, and further evaluated in the field in 2016.</li> <li>• Based on the experience and knowledge from the field work, both bundling and tying mechanisms were further improved.</li> </ul>	Achieved
Develop sensing system for floricanes identification	<ul style="list-style-type: none"> <li>• Hyperspectral camera images were used to distinguish floricanes and primocanes.</li> <li>• Floricanes were painted with food grade and water-based colors to investigate the potential of using color-camera for automated floricanes identification.</li> <li>• Orange color showed more promise than other colors.</li> </ul>	Goal achieved; The team also hypothesized that further improvement in detection accuracy may be achieved using a spectroradiometer with wider spectrum than the currently used hyperspectral camera.
Develop and evaluate pruning mechanism	<ul style="list-style-type: none"> <li>• Pruning machine conceptual design was explored.</li> <li>• A scissor type end-effector was integrated with a robotic arm and evaluated in the lab.</li> </ul>	Lab evaluation was completed;  Because of additional focus in detecting floricanes with different methods and also change in the horticultural studies, field evaluation of pruning mechanism was not pursued.
Outreach activities	<ul style="list-style-type: none"> <li>• Update to Small Fruit Conference in December 2013 and 2014.</li> <li>• A presentation was also given in WA Red Raspberry Commission Meeting in October, 2014.</li> <li>• Team participated in the Raspberry Research Roundtable held on Oct 8, 2014, November 4, 2015 and October 12, 2016.</li> <li>• Team members also presented their work in expos and meetings including Washington Hort Show (Yakima, 2015), precision farming expo (Kennewick, 2016) and WSU CPAAS open house (Prosser, 2015).</li> </ul>	Achieved

As discussed before, novel engineering solutions for red-raspberry cane bundling, tying and floricanes identification was developed and evaluated. As there have been limited effort in the past towards solving this important problem for red-raspberry industry, this outcome leads the industry much closer to meeting the long term target of reducing labor use in red raspberry pruning and tying by 30 to 50%.

## **BENEFICIARIES**

There are approximately 130 red raspberry growers in WA State and another 50 in the larger growing region which includes Oregon and British Columbia. All red raspberry growers rely on hand pruning and tying. Increasing labor costs and availability are priority concerns for the future of this industry.

The output and outcome of the project including information on the yield and horticultural parameters on the new red raspberry plot in Prosser has benefited WA red raspberry growers in all production areas including south east and north west regions. When the output of this project including red-raspberry cane bundling and tying mechanisms are commercially adopted, the industry will further benefit from this work. Researchers working in red raspberry crops were also benefited by the availability of the replicated varietal plot at WSU research center that was available for other research projects. One of those projects carried out by other WSU researchers was on evaluation of different chemicals for cane burning.

As described in the Project Approach portion of this report, three red-raspberry varieties (Chemainus, Meeker and Wakefield) were tested in this work for effectiveness of chemical cane burning, which showed a significant difference in TA following the cane burning with Wakefield variety having the highest TA of 2.06%. Size of young two-year old plants was found to be varying from 4 to 11 cm in diameter (assuming a circular plant). The engineering studies carried out in the project showed that the success rate of the designed cane bundling mechanism was about 97% and the accuracy of florican detection was found to be 85%. These results show a promise for further development and eventually commercial adoption of automated or robotic red raspberry pruning and bundling tasks.

### **LESSONS LEARNED**

There has been only limited commercial production of red raspberry in the south east Washington area. Planting and maintaining a red raspberry plot with different varieties planted in a randomized way provided an excellent infrastructure for various types of research including engineering and automation solutions investigated by the team for red-raspberry bundling, tying and pruning. The plant canopies, though maintained following standard commercial practices, did not seem to grow as well as some of the commercial platting the investigators have visited in Mt. Vernon and Lynden, WA. It could be because of the difference in weather conditions between the two regions of the state. In 2014, some winter injury was observed in the top third of the canes, but with no particular pattern.

It was proposed to implement an in-row alternate year cropping system to physically separate primocanes (1 year old canes) and floricanes (2 year old canes) so that the pruning task could be simplified. After considering the growth pattern of canes in the test plot and the size of a smaller clip for the lower trellis wire (as proposed), it was decided that the canes would be too compressed and the canopy too dense if alternate year cropping system was implemented. Thus the proposed alternate year training system was not pursued further.

Mechanization and automation technologies investigated for cane bundling and tying showed a great potential for developing practically adoptable solutions. For example, the bundling mechanism prototype developed in this work successfully bundled and tied red-raspberry plants with up to 7 canes. Further research to improve the speed of operation, and to evaluate the system in more diverse cropping systems and varieties would be important to further increase the potential for commercial success. The work also showed that color painting of canes (after pruning) could be a simple yet effective method to detect floricanes (for pruning) from the complex mix of primocanes and floricanes using a color camera. Orange food grade color painting remained highly noticeable to color cameras for more than 6 months. Hyperspectral imaging also showed a promise for differentiating primocanes and floricanes as can be seen by the spectral signature differences depicted in Fig.7. The accuracy achieved for florican detection with hyperspectral sensing was more than 85%. To further improve the detection accuracy, it can be hypothesized that spectral measurement up to 2500 nm wavelength will be helpful as differences could be further enhanced in the spectrum range of 1000 nm to 2500 nm. The WSU team has plans to continue investigating the spectroscopic analysis beyond this project using a free-of-cost equipment loan that has already been awarded to Co-PI Karkee by ASD Inc. (Boulder, CO).

The next step after the detection of floricanes would be to actually cut those canes out of the canopies. In this project, a scissor type end-effector and a robotic manipulator (Fig. 8) was evaluated in a laboratory setting for its speed and effectiveness in cutting woods/canes. However, accessing floricanes in the mix of primocane and florican remains an important challenge in the current cropping systems. It is important that both horticultural modifications and automation solutions are developed in collaborations so that a systematic solution can be developed for pruning. Irrespective of how pruning occurs as further studies are continued in the future beyond this project, 60% of the manual labor is involved in cane bundling and tying, for which the automation solution investigated in this project brings us much closer to having a practically adoptable solution.

No unexpected outcomes or results affected this project.

As discussed in above, in-row alternate year cropping system is a challenging horticultural problem and may require an innovative solution. A simpler solution to the proposed in-row alternative year cropping would be spatially separating crop for alternate years, such as alternate rows or even alternate plots used for alternate year cropping. Total yield and economic analysis of such a system are being evaluated by other scientists and one of the grower collaborators (Maberry Packing). It was also discussed above that use of a spectrometer that can provide spectral signature from 400 nm to 2500 nm could help improve the accuracy of florican detection.

#### **ADDITIONAL INFORMATION**

<b>COST CATEGORY</b>	<b>Grant Funds</b>	<b>Invoiced</b>	<b>Balance</b>	<b>Total Project Cost</b>
Contractual	\$169,926	\$169,926	\$0	\$169,926
<b>TOTAL</b>	<b>\$169,926</b>	<b>\$169,926</b>	<b>\$0</b>	<b>\$169,926</b>
Matching Funds	WRRC, farm contributions	\$382,101	\$0	<b>\$382,101</b>

All funds were contracted with Washington State University. WRRC contributed an additional \$30,000 to the contract. WSU used the funds to partially or fully support salaries of one post-doc and two graduate students. WSU also used the funds to establish and maintain a red raspberry plot at WSU Prosser. Some part of the funds were also used to purchase materials and supplies to build and evaluate prototypes in red-raspberry fields. WRRC administration of the project was valued at \$7,500 in in-kind match, two farms where the research took place contributed \$102,000 in in-kind services supporting the project, and WSU added \$72,675 in in-kind support.

#### ***Publications and Posters:***

*Shrestha, A., Karkee, M. and Zhang, Q., 2016. Mechanism for Bundling and Tying of Red Raspberry Primocanes. IFAC-PapersOnLine, 49(16), pp.166-170.*

*Shrestha, A., M. Karkee and Q. Zhang, 2015 (Poster). Automation of Red Raspberry Bundling and Pruning. 2016 Precision Farming Expo, 6-7 January, 2016; Kennewick, WA.*

*Shrestha, A., M. Karkee and Q. Zhang, 2015 (Poster). Efforts Toward Automation of Red Raspberry Bundling and Pruning. 2015 Washington State Tree Fruit Association Annual Meeting, 7-9 December, 2015; Yakima, WA.*

#### ***Additional Pictures:***

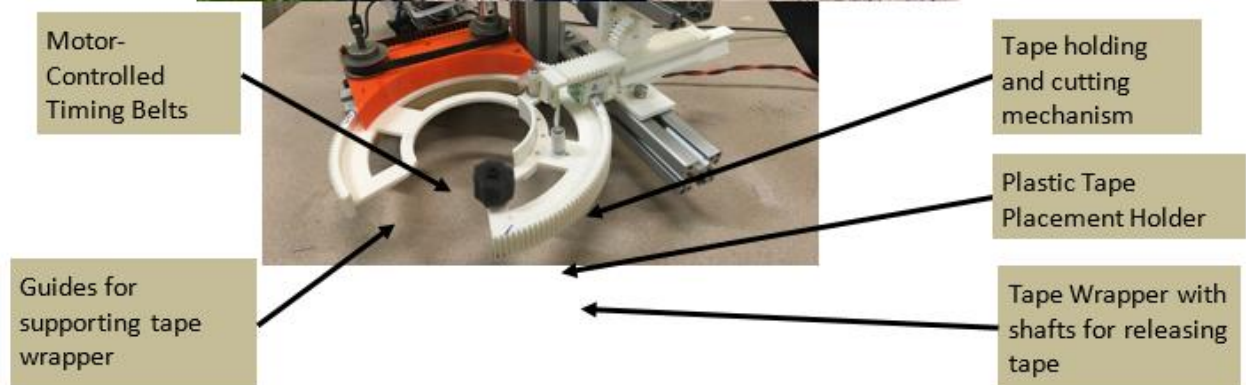


**Co-PI Manoj Karkee (WSU Associate Professor) discussing about red raspberry pruning and bundling process with growers, and horticulturists.**

**Co-PI Manoj  
Associate  
graduate  
Shrestha  
raspberry  
WA with PI  
grows  
the middle),**



**Karkee (WSU  
Professor) and  
student Aadit  
visiting red  
fields in Lynden,  
Henry Bierlink,  
(Randy Honcoop in  
and horticulturists.**



**Final prototype with tape wrapping, tape cutting and tape grabbing mechanisms.**

### **CONTACT INFORMATION**

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